The Mining Journal

LONDON, SEPTEMBER 5, 1958

Vol. 251. No. 6420. Price Ninepence

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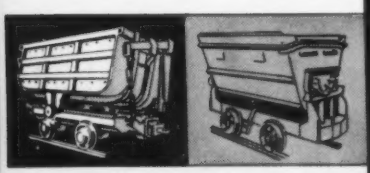

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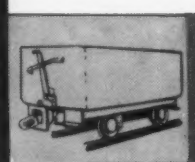

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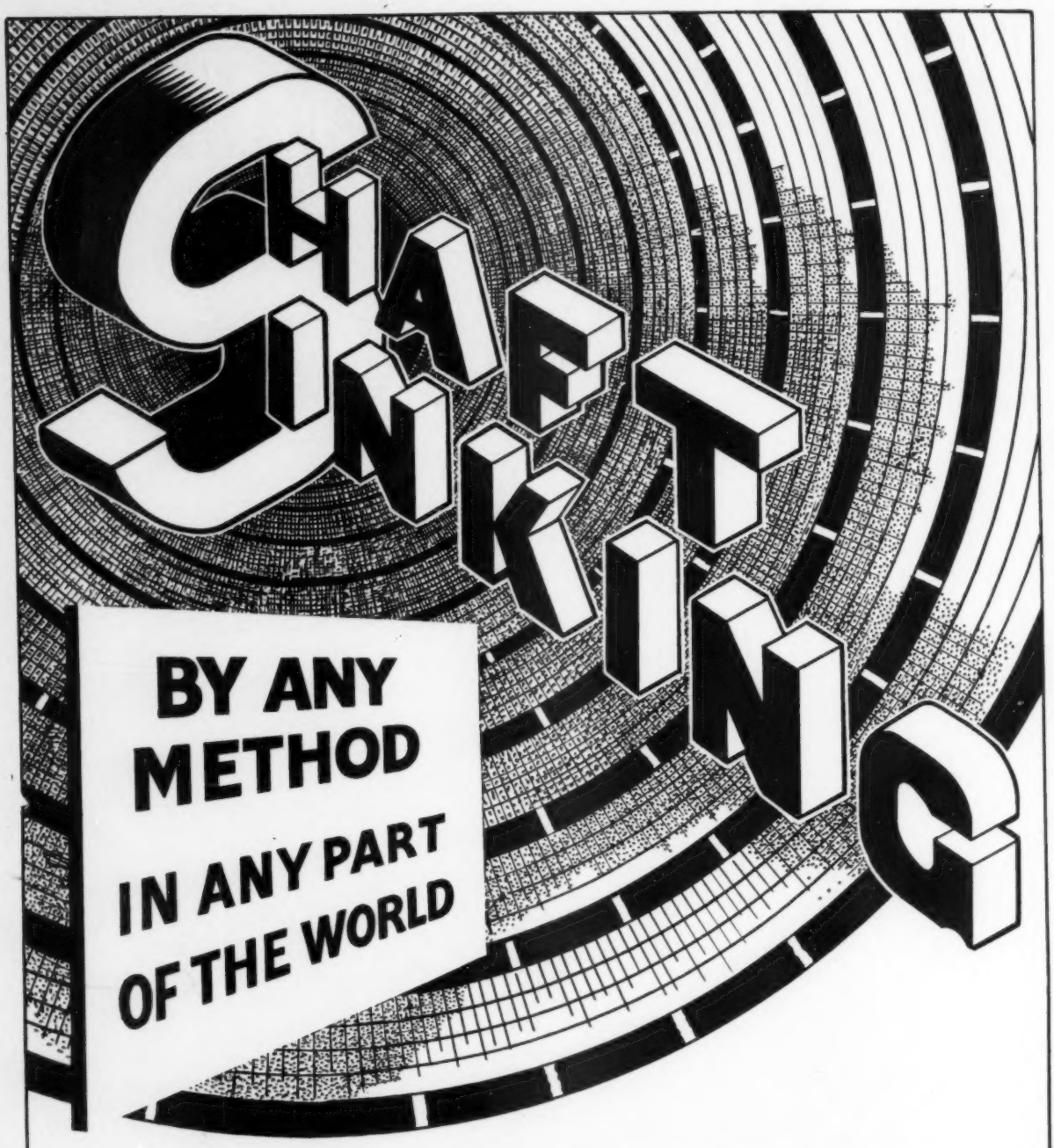

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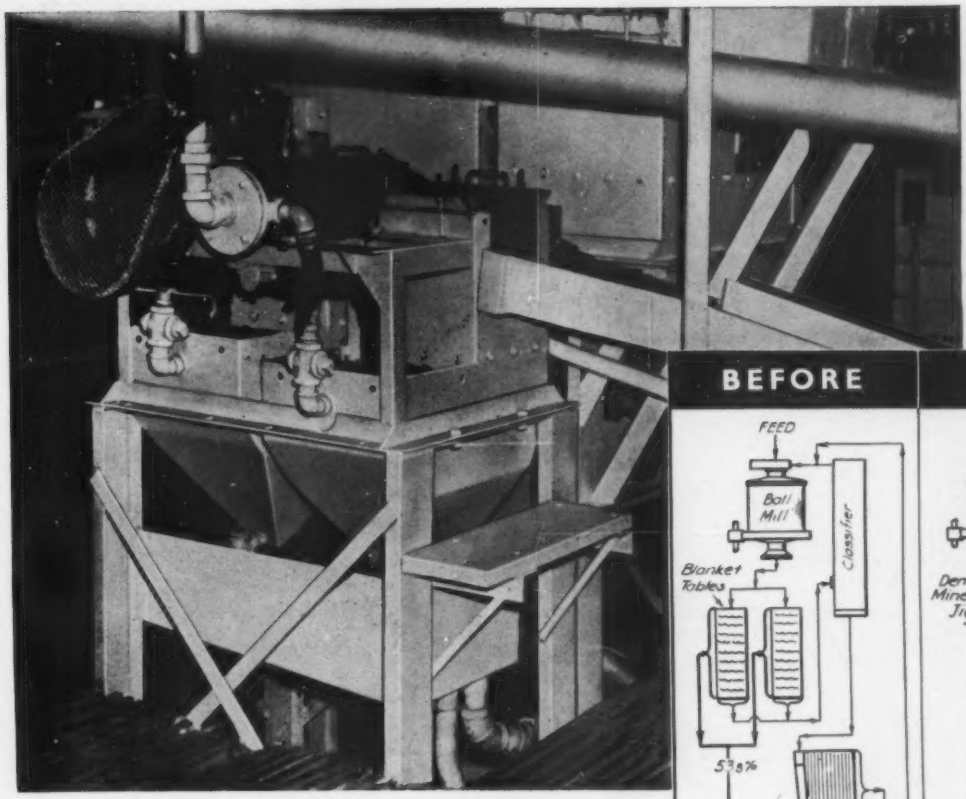

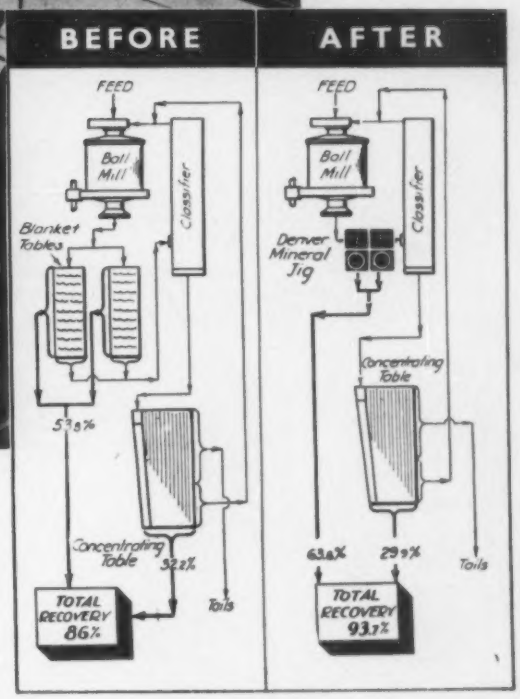

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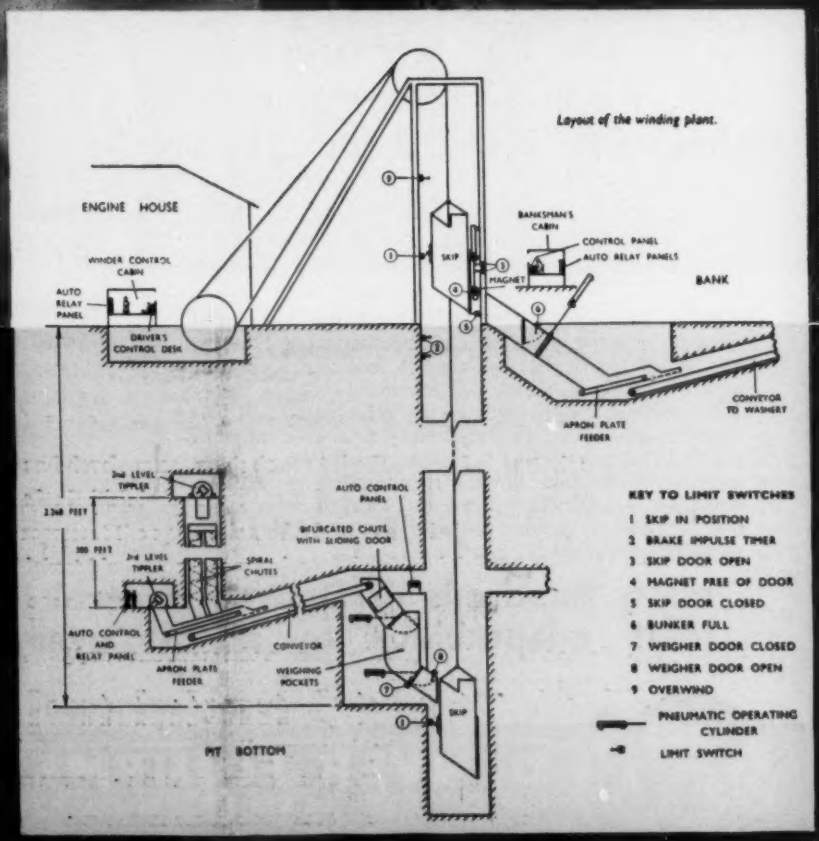
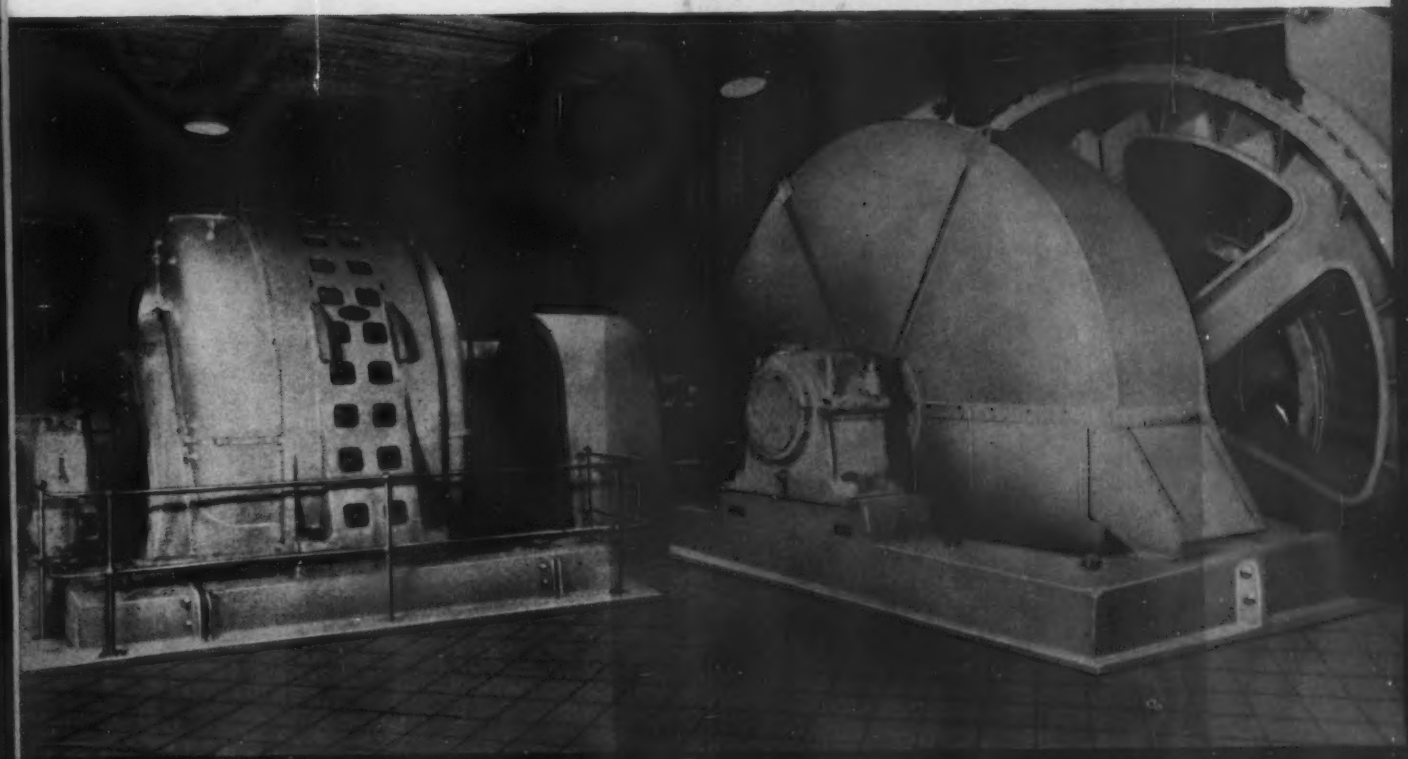


Layout of the winding plant.

winding at a colliery in South Wales

The 3000 h.p. automatic a.c. winder installed at an N.C.B. Colliery in the South-Western Division, is one of the largest of its type to be built anywhere in the world. It is also the first of its type to operate at 11,000 volts.



With a rope speed of 30 ft. per second two skips each of 12 tons capacity raise 510 tons per hour from a depth of 2268 ft. **entirely without supervision** for as long as coal is available at the shaft bottom and cleared at the top.

This automatic operation is made possible by the use of the G.E.C. patented closed loop system of speed control which ensures a close relation between the steady winding rope speed and the speed dictated by the winder control equipment.

The G.E.C. also supplied this colliery with a double drum service winder, the coal preparation plant and two 8000 kW turbo-alternators.

Further details are given in the G.E.C. Installation Leaflet No. 19 which will gladly be sent on request.

G.E.C. winding equipment

THE GENERAL ELECTRIC COMPANY LIMITED
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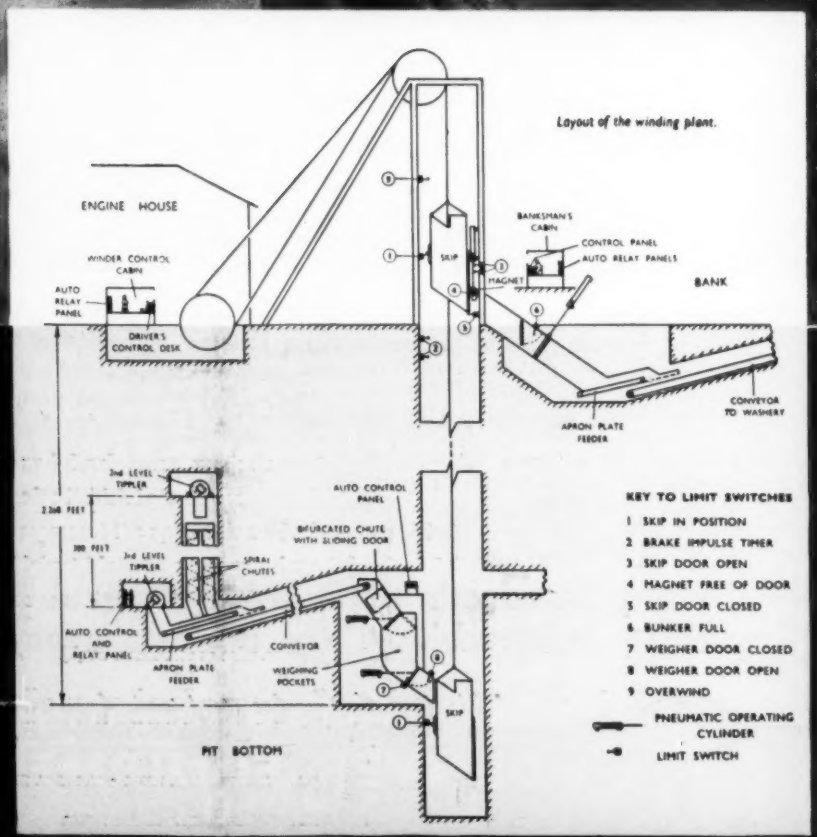
automatic


Layout of the winding plant.
ENGINE HOUSE
WINDER CONTROL CABIN
AUTO RELAY PANEL
DRIVER'S CONTROL DESK
BANKSMAN'S CABIN
CONTROL PANEL
AUTO RELAY PANELS
SKIP
MAGNET
BANK
CONVEYOR TO WASHERY
APRON PLATE FEEDER
2nd LEVEL TIPPLER
2368 FEET
300 FEET
3rd LEVEL TIPPLER
SPIRAL CHUTES
AUTO CONTROL AND RELAY PANEL
APRON PLATE FEEDER
CONVEYOR
WEIGHING POCKETS
AUTO CONTROL PANEL
BIFURCATED CHUTE WITH SLIDING DOOR
SKIP
PIT BOTTOM
KEY TO LIMIT SWITCHES
1 SKIP IN POSITION
2 BRAKE IMPULSE TIMER
3 SKIP DOOR OPEN
4 MAGNET FREE OF DOOR
5 SKIP DOOR CLOSED
6 BUNKER FULL
7 WEIGHER DOOR CLOSED
8 WEIGHER DOOR OPEN
9 OVERWIND
PNEUMATIC OPERATING CYLINDER
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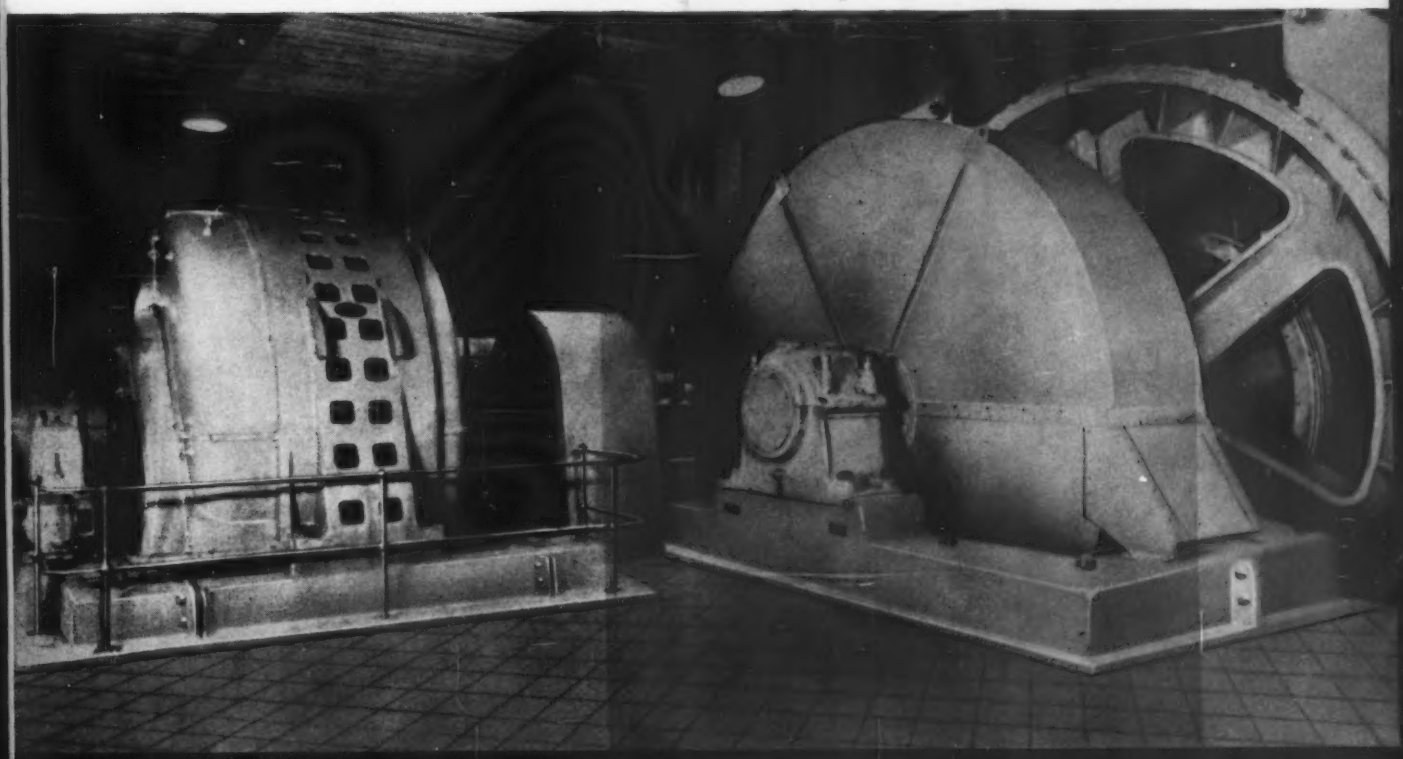
winding at a colliery in South Wales

The 3000 h.p. automatic a.c. winder installed at an N.C.B. Colliery in the South-Western Division, is one of the largest of its type to be built anywhere in the world. It is also the first of its type to operate at 11,000 volts.



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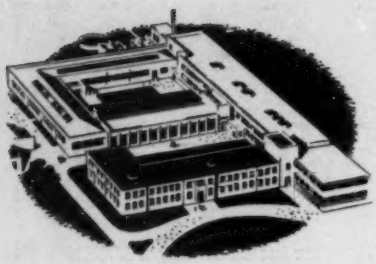

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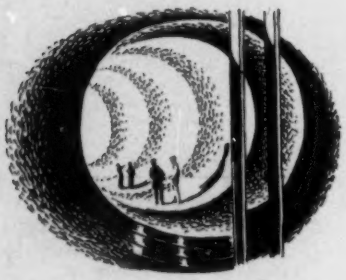

This research and development work done at the Banbury Laboratories ultimately benefits British industry as a whole. These facilities are costly and represent the application of scientific and industrial skill of the very highest kind. The laboratories of the Aluminium Limited Group of Companies are an investment in the future of the aluminium industry.

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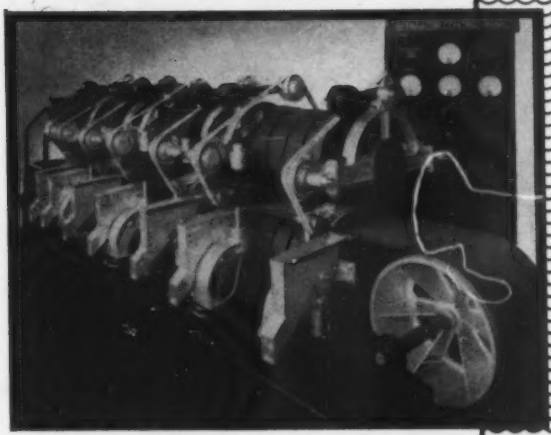
Magnetic separation of wolfram in PORTUGAL



Portugal, with the most extensive tungsten deposits in Europe, annually produces over 4,000 tons of concentrates. Wolframite is the main tungsten mineral, the principal associated minerals being cassiterite, pyrite, arsenopyrite, chalcopyrite, ilmenite, siderite and tourmaline.

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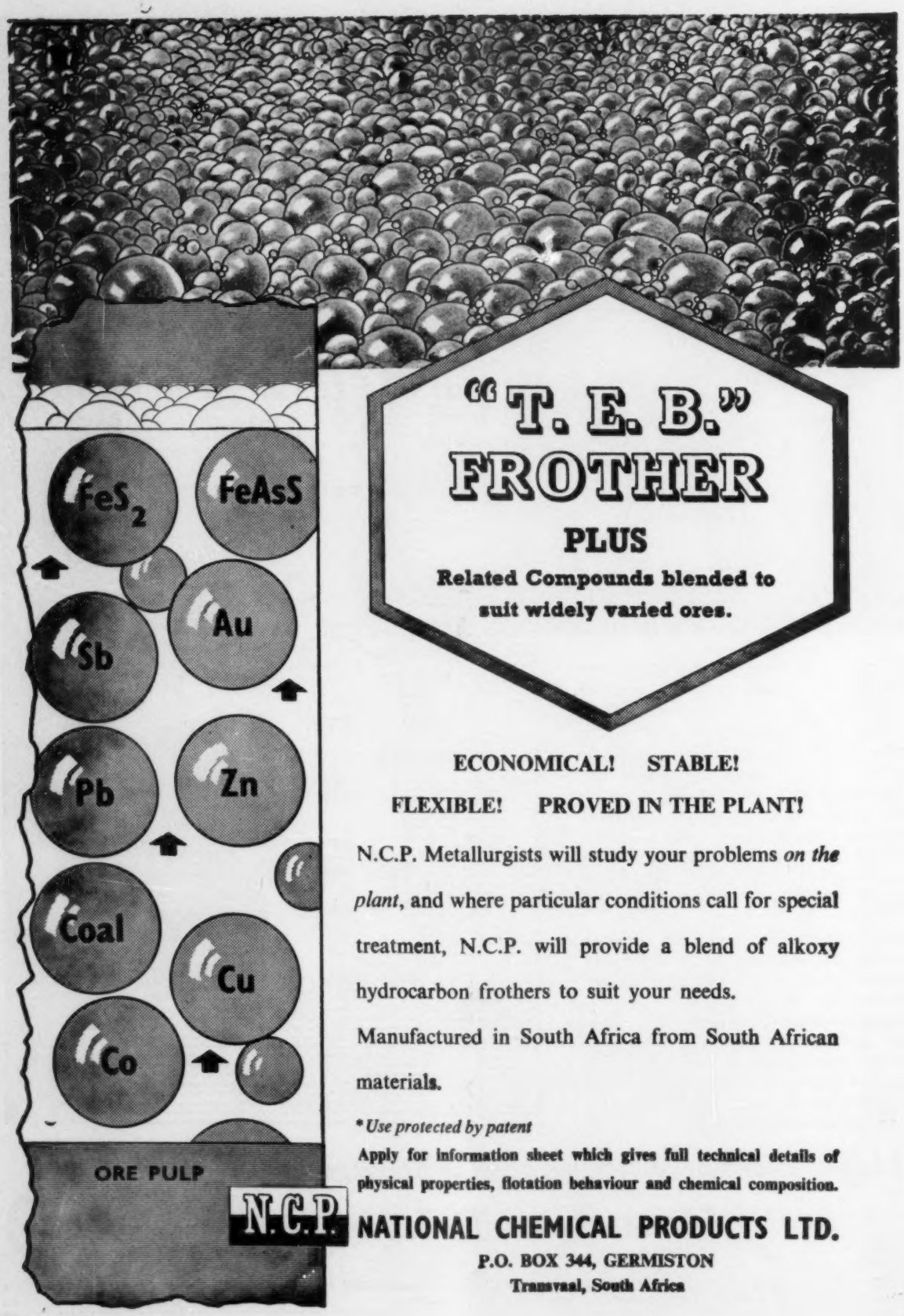

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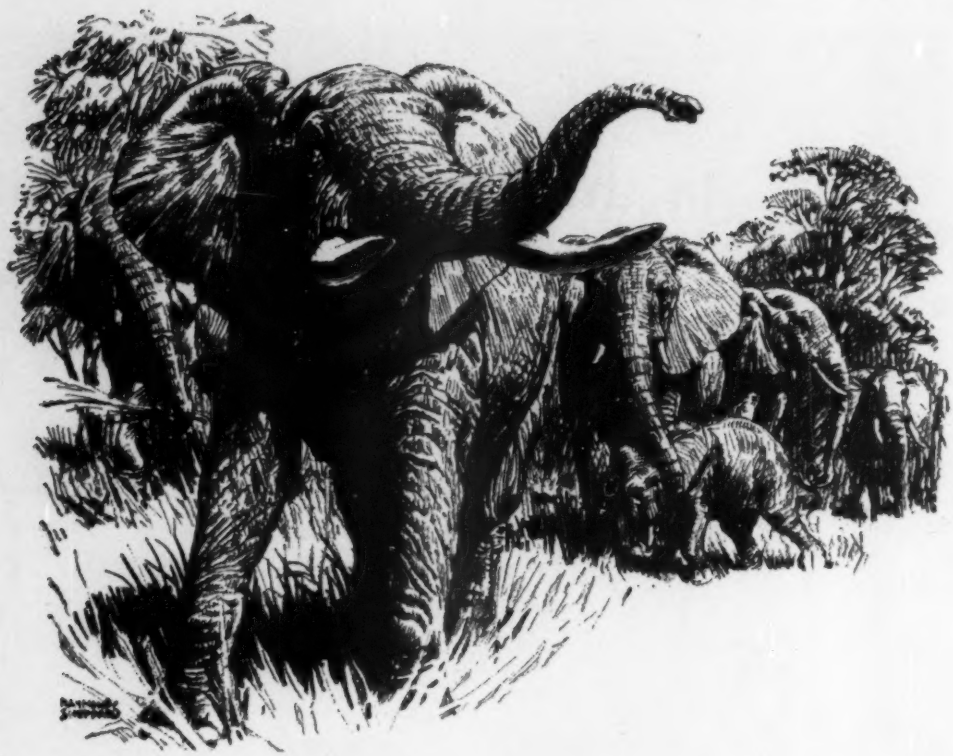

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The Mining Journal

London, September 5, 1958

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Restrictions on Russian Tin

SINCE October last year, when the London cash price fell to a floor of £730, at which the buffer stock manager of the I.T.C. had to buy, the nigger in the tinpile has been the rising flow of Russian metal. During 1957 this flow became progressively more substantial, some 9,000 tons of tin from the U.S.S.R. and Eastern Europe being exported to the Free World, compared with 450 tons in 1956. This year Russian exports, like the worm in the fairy story, have gone on growing, until it seemed possible that the annual total might even exceed 16,000 tons.

Quantitatively, Russian exports have been on a sufficient scale to become a costly embarrassment to the I.T.A. Psychologically they have been even more troublesome, not only because of the unknown quantity which they introduced into the supply-demand equation, but also because of the timing of offerings, which seemed to turn up like a cuckoo's egg in a robin's nest whenever the cash price showed signs of leaving the floor. They may also have deferred the revival of consumer demand — which alone can re-establish the tin trade on a thriving basis — by encouraging users to run down stocks in the belief that the I.T.C. would be unable to hold fast indefinitely against the tide of Russian tin.

While the I.T.A. countries were restricting production, at the cost of unemployment and drastic curtailment of export earnings, the Communist countries have been benefiting from the floor price thus onerously maintained. It is quite evident that Russia has no intention of proving the sincerity of her concern for the less highly developed countries. It is over two months since the I.T.C. took the logical (if, perhaps, over-optimistic) step of inviting the U.S.S.R. to join the Agreement. The response has been essentially negative, the Russian proposal to send an observer to the Council being valueless in the absence of any offer to restrict supplies. At the time of writing Malaya's direct appeal for co-operation apparently remains unanswered.

Fortunately there are usually more ways than one of killing an economic cat. At this critical period the British Government has made a dramatic intervention by severely curbing imports of tin into the U.K. As from August 30, tin originating in or consigned from the U.S.S.R. is limited to a quarterly flow of 750 tons.

In order to prevent possible evasion of import restriction by shipment of Russian tin through other Communist countries, imports of unwrought tin and tin alloys from the Sino-Soviet *bloc* are now subject to individual licensing.

It is by no means inconceivable that the measures announced by the Board of Trade might have the effect of causing Russia to become a full member of the I.T.A.—a development which would assuredly be welcomed greatly by the six major producing countries who are already members. In this context it has been pointed out that 3,000 tons per year is equivalent to roughly 50 per cent of potential imports of Russian tin into the U.K. Russian tin imports reached 3,452 tons in the first six months of this year, which might be taken as implying a total potential of between

5,000 and 6,000 tons for 1958. Cuts of between 40 and 50 per cent would place Russia broadly in the same position as the six I.T.A. producer countries.

Dutch imports of Russian tin ore are to be cut by 40 per cent of the last 12 months' total, which was about 1,510 tons, compared with about 790 tons in 1956-57.

The U.S. and Australia already refuse to allow any imports from the Soviet *bloc*. According to reports from Malaya, several other countries have agreed to limit imports of Russian tin. On behalf of the Danish Foreign Ministry, it has been stated that the possibility of Denmark importing Russian tin is not precluded, but Denmark has not previously imported any metal from this source.

West Germany will take no official action to restrict tin imports from Russia. Under a three-year pact she is committed to granting import licences for 2,000 tons of tin in the current year and 3,000 tons in 1959. Up to the end of July, however, direct imports of Soviet tin totalled only 445 l.tons. So far as is known Japan has not yet accepted any Russian tin.

In the face of past disappointments predictions cannot be lightly made. However, it is at least evident that prospects for a sustained rise in tin prices have been immeasurably improved. Moreover, the increasingly favourable business reports from the U.S. augur well for the resurgence of consumer demand, at any rate on a modest scale. Finally, the fact that the buffer stock manager has already taken over 25,000 tons off the market is in itself a significant contribution towards the elimination of surplus metal.

The market's first reaction to the British and Dutch decisions to restrict imports of Russian tin was a £20 rise, with spot metal traded at £752. Since Monday morning, however, strong selling pressure and little response from buyers has brought the price back to a point little above the support level—a reminder that, although the trees are perhaps thinning, tin is not yet out of the wood. It has been suggested that the sales may have been largely of Russian metal brought into the country before the new regulations. The main cause of the market's behaviour, however, is the feeling that the gap will not be effectively plugged unless and until similar restrictions have been imposed by all major consuming countries.

RADIATION HAZARDS IN URANIUM MINES

Radiation dangers to workers in uranium mines can be curbed by adopting adequate mechanical-ventilation methods and by stringent dust-control practices, states the Bureau of Mines, U.S. Department of the Interior in its latest report on this subject.

The chief source of radiation in underground uranium workings is radon, a heavy radioactive gas emitted from the ore and from water seepages. Radon is itself a health menace and, through a process of atomic decay, produces other harmful substances which on over-exposure may cause lung cancer. Citing a recent Public Health Service study which showed that over half the U.S. domestic uranium mines have atmospheric concentrations of these radioactive contaminants that are far above the levels considered "reasonably safe for industrial exposures", the Bureau's report warns that extensive mechanical-ventilation and dust-control measures are necessary to reduce these pollutions.

Additional precautions recommended by the Bureau are frequent baths and clothing changes for all underground workers, and annual medical examinations. Eating and storing of food in uranium mines should not be permitted. The principal uranium-producing states have adopted rules and regulations to cope with the major hazards and the Bureau report urges all concerned with uranium mining to be familiar with such measures and comply with them.

A copy of Information Circular 7834, "Engineering Control of Health and Safety Hazards in Uranium Mines", can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number and title.

FIJI'S MINERAL RESOURCES

The mineral resources of Fiji are reviewed by the Colony's Geological Survey in its annual report for 1957.

Chemical analyses confirmed the presence of bauxite from several localities. Whether this mineral occurs in sufficient quantity to be of commercial use is currently being investigated by representatives of Aluminium Laboratories Ltd., Montreal, who have taken out extensive prospecting licences.

There is a demand for barytes in Australia. After current specifications were obtained it seemed possible that high- or even medium-grade Fijian barytes could be exported profitably, and a geological investigation was made on one favourably situated outcrop. Further development is recommended in an attempt to prove the grade and quality at depth.

Numerous enquiries were received concerning copper mineralization and examination of several potential copper-producing areas was undertaken. The most notable of these were the deposits centred around Wainivesi, the copper-zinc mine in east Viti Levu, where small-scale mining continues and some copper ore was exported. Additional copper-zinc claims with subsidiary amounts of lead and generally traces of gold and silver were discovered and mapped in detail. Some development work on these was undertaken by a large company holding a prospective licence over this area.

Samples of coaliferous material were found by the Mineral Resources Division, London, to contain relatively high amounts of germanium (580 ppm. or 0.058 per cent). Further collecting and analyses will be made.

Several visits were made to the Emperor Gold Mines. In west Viti Levu geologists also visited a disused mine in the Vuda river area and the Mistry Gold Mine, which was inoperative at the time of the visit. A gold prospect at Dakuniba, Vanua Levu, was examined in detail, but delayed assay results held up the report.

Small pellets, often of good quality manganese, and black earthy wad, occur widely within the Colony, but generally in limited amounts. As a contribution towards a comprehensive work on the Colony's manganese deposits, a detailed survey was undertaken on four localities in the Vunamoli region, west Viti Levu. All the deposits appear to be related to zones of shearing. At the request of Metal Traders Ltd., several visits were made to Nasaucoko (Consolidated Manganese Mining Co.), the largest manganese producing mine in 1957, advice being given on the probable structure of the orebody and formation of the ore. A churn drill is being acquired by the management and a tentative drilling programme was suggested on the information provided.

Pumice-rich material in eastern Vanua Levu is believed to have commercial possibilities as it could probably be milled and used as an abrasive powder.

Three portable ratemeters were received on extended loan from the U.K. Atomic Energy Authority. As a result of their use radioactivity, believed to be the first recorded in the Colony, was detected by a government geologist when examining a copper claim at Nukudamu. The exact

amounts of uranium and thorium present are being determined chemically in London.

Other mineral resources mentioned in the report include beach sands, iron, lignite, limestone and phosphates.

With the arrival of additional staff, the Geological Survey was able to expand its efforts to assist in the development of Fiji's natural resources by systematic and reconnaissance geological mapping. The first geological map ever to be produced of Vanua Levu was prepared on a reconnaissance scale.

INDIAN IRON ORE EXPORTS

The export of iron ore from India during 1957, which was 2,262,000 tons, exceeded the second Five-Year Plan target by 262,000 tons. Japan, Czechoslovakia, and Poland continued to be the principal buyers of Indian iron ore. The quantities exported to these countries were 1,347,040 tons, 476,833 tons and 138,203 tons respectively. Nearly 59 per cent of the total exports of iron ore went to Japan.

The State Trading Corporation of India, which is handling the entire export of iron ore with effect from July, 1957, has already entered into an agreement with Japan for the supply of 7,200,000 tons of iron ore over a period of five years.

Meanwhile, an official Indian delegation, led by Mr. D. Sandilya, Joint Secretary of the Ministry of Commerce and Industry, Government of India, and managing director of the State Trading Corporation, visited Japan for discussions with the Japanese steel industry on the supply of Indian iron ore during 1958-59. Under the agreement the contract for the first year, 1957-58, was for a total quantity of 1,300,000 tons.

In view of the general slowing down of steel production throughout the world, including Japan, there was said to have been some reluctance on the part of Japanese steel manufacturers to stick to the original schedule of supplies. However, under the new agreement which has been signed, Japan is expected to buy 1,400,000 tons of Indian iron ore during the fiscal year 1958-59 at a price between 80s. and 81s. per ton. Shipments are expected to begin this month and continue until July, 1959.

DEVELOPMENT OF SIBERIA'S RESOURCES

Outside the U.S.S.R., Siberia is looked upon mainly as a bleak and inhospitable region to which prisoners and political exiles have been sent since Tsarist times. Though the rich natural resources of this territory have long attracted attention, it is only in the last 30 years that their development has been seriously attempted.

During the first Five-Year Plan (1928-32), a new metallurgical base was created by the construction of the Magnitogorsk Iron and Steel Works in the Urals and the Kuznetsk Iron and Steel Works in Siberia. In the absence at that time of reliable information regarding the distribution of Siberian ore fields, it was decided to use Urals iron ore for the Kuznetsk Iron and Steel Works, and Kuznetsk coal for the Magnitogorsk Iron and Steel Works. Now increasing production from other and nearer sources has made it possible for transport of coal to the Urals from the Kuznetsk basin to be entirely discontinued. Kuznetsk's fuel resources will be the basis of a new industrial complex being developed under the current five-year plan.

The Kuznetsk basin and adjacent areas are rich in coking and steam coal. Rich iron ore deposits have been discovered in Gornaya Shoria and Khakassia. Manganese ores, limestone deposits and many other minerals are also found in Siberia. The new metallurgical base should thus be assured of adequate supplies of raw materials.

Construction of the West Siberian and two other metallurgical plants in Siberia is scheduled for the current five-year period. These new plants, together with those already functioning, will form the nucleus of the U.S.S.R.'s third metallurgical base. The West Siberian Iron and Steel Works will be one of the largest in the Soviet Union. The other two iron and steel plants, to be built in the Krasnoyarsk Territory and Irkutsk Region, will also be very large modern enterprises.

A conference of planners, scientists and industrialists met recently in Irkutsk to project plans for the future development of Eastern Siberia whose gross industrial output is scheduled to grow more than four-fold between now and 1965. The main task facing the conference was a comprehensive study of the problems connected with the fullest possible use of Eastern Siberia's natural resources.

A number of questions put to him by an Irkutsk paper were answered by Mr. Ivan Bardin, vice-president of the U.S.S.R. Academy of Sciences and chairman of the Organizational Committee for Developing the Productive Forces of Eastern Siberia. Mr. Bardin pointed out that Russia's cheapest coal reserves are to be found in Eastern Siberia and he drew attention to the enormous quantities of electric power to be generated by undertakings which, he claimed, would be the world's largest power stations.

Besides completing the many installations and enterprises already under construction, it is planned to build a large metallurgical plant at Taishet, north-west of Irkutsk, two aluminium works at Irkutsk and Krasnodar, and several chemical factories. It is stated that eventually Eastern Siberia will become a major centre of the Soviet aluminium industry.

It is anticipated that the new metallurgical base in Siberia will lead in turn to the development of yet another new base in the Transbaikal area. According to the *Industrial and Economic Gazette*, at present the only minerals being exploited in Transbaikalia (Siberia beyond Lake Baikal) are non-ferrous ores. However, a major deposit of molybdenum near Sirigichensk, discovered five years ago, still remains untapped. Geologists have found deposits of other minerals, including titanium-bearing magnetite, in the region of Chita, but exploitation is hampered by the lack of concentration plant and smelters and by inadequate electricity supplies.

PHOSPHATES AND POTASH IN ISRAEL

Replying to a question in Parliament recently, the Minister of Development, Mr. M. Bentov, said that some of Israel's phosphate deposits contain a certain percentage of uranium.

Potash production at the Dead Sea Works, in the first half of this year, totalled 47,000 tons, as compared with only 37,000 tons during the corresponding period in 1957. The management of the works predicts a further increase in production during the second part of the year, so that annual output may reach a total of 100,000 tons. This rise is expected to result from the introduction of a plan for expanding the facilities to store carnellite. It is also believed that when this plan is in full operation the plant will succeed in producing 150,000 tons per annum.

On the fifty-fifty basis, the Minister of Development has recently proposed a partnership to a British firm interested in Negev phosphates. The Minister thinks that under this condition, investors need not fear eventual state domination, while the state can still retain its influence on the exploitation of natural resources.

Exploitation of a garnet deposit at M'Borsa

MADAGASCAR—I

Madagascar's Mineral Resources

FRENCH-controlled Madagascar, stretching 1,000 miles in the Indian Ocean along the eastern coast of Africa, is the fourth largest island in the world. Her area of 240,000 sq. miles makes her as large as France and the Benelux countries together.

The island has an extremely wide range of mineral and power resources. Although some measure of exploitation of this big wealth has been under way for a considerable time, one or two really big deposits, with high mineral contents, have yet to be uncovered to give a shot in the arm to the somewhat slumbering local mining industry.

Geological Formations

Comparatively recent sedimentary terrains are encountered in Western Madagascar, along the Mozambique Straits that separate it from the mainland. These originated in the Carboniferous age and range up to the Tertiary period. They contain hydrocarbons, bituminous schists, lignites, and coal.

For two-thirds of her area and mainly in the eastern part, the island is made up of very ancient crystalline terrains, which were subjected at an early stage to metamorphic phenomena. A good deal of volcanic activity took place. Thus, these terrains are shot with intrusions and eruptive seams, which fumaroles are believed to have enriched with heavy minerals.

Mineral resources of almost every description have been uncovered here : nickel, chromium, lead, zinc, copper, iron, titanium, mixed oxides of uranium and thorium, asbestos, vermiculite, quartz. Gold, precious and semi-precious stones come as the cherries atop the whipped cream.

Generally laid bare by erosion and presenting surface alterations, the crystalline orebodies are thus capable of easy opencast mining — and often they go down to considerable depths. Valuable ores lie right at the surface or at shallow depths, obviating the necessity to use costly equipment. Such features give ample scope to the small concern. The search for gold, precious and semi-precious stones, is often the affair of individual prospectors, rather than large companies.

Exploitation of marly limestone in Madagascar

Gold and Copper

According to geologist R. Lacroix, the yellow metal was derived originally from impregnations in crystalline schists. Sillimanite mica schists carry, *inter alia*, enough gold content to be worked economically on an industrial scale by one or two undertakings. Lodes occur infrequently, apart from the Andavakoera, Ambatombe, Dabolava and Marovato regions, which have come in for some measure of methodical exploitation at the hands of European ventures.

Over the rest of the country, certain detritic placers have been exploited at one time or another since 1883. A first systematic reconnaissance, conducted at the turn of the 20th century, revealed the presence of gold over widespread areas. Production reached a peak of 3.7 tonnes in 1909, falling to between 1,000 and 2,500 lb. in subsequent years.

By Maurice Moyal

Editor of "Petroleum Mirror", the monthly newsletter of the French petroleum industry.

When it comes to more recent times, it is impossible to give even approximate figures. Exports are insignificant, for local jewellers are eager to absorb all the output at nearly double the price obtaining in Paris. Hence, permit-holders refrain from revealing the whole picture, and are in turn given a taste of their own medicine by native gold-diggers working for them. Sluicing is done by hand, in the best style of Alaska's gold rush days.

However primitive and wasteful, this queer *modus operandi* permits, nevertheless, the working of very low-grade placers, with some 0.3 grm. content per cu. m. of gravel. But the turnover of local personnel is very high.

After conducting detailed studies over the impregnated zones, exploited off and on by such haphazard methods, the Bureau des Mines de la France d'Outre-Mer (BMFOM) deems that such small uneconomical exploitations should not be helped to survive. Its well-documented report states that the day has come for a real gold industry to treat primary and alluvial deposits. The tremendous reserves will more than make up for their low metal content, but the most up-to-date machinery is needed.

The existence of copper indices has been known for a long time in South Madagascar. Three deposits have been probed by BMFOM.

At Ambatovarahina, in South-Western Madagascar, the orebodies were actually worked between 1900 and 1912. Following the sinking of further reconnaissance shafts, the work was subsequently abandoned. A mission sent in by BMFOM found that the mineralized zone here was limited in extent, extending for only 656 ft. It is made up of thin seams, connecting a certain number of pockets 1 - 1.5 ft. thick by 3.5 - 7 ft. long.

The nearby Vohibory deposits have seemed important enough to warrant the establishment of a special syndicate, controlled by the Mine Bureau, to exploit them. They have been the subject of a core drilling campaign, and geophysical studies were recently reported under way.

Indications have also been uncovered at Anavona, in the same region, while at the opposite end of the island the Vohemar region is highly thought of for its copper potentialities. Some Frs.200,000,000 have been allocated to a preliminary copper survey.

Promising Deposits Await Advent of Cheap Power

A sizeable nickel deposit has been discovered at Valozoro, near Ambpsitra. It is deemed quite capable of commercial exploitation, if power could be provided to treat the ores cheaply enough to make the finished product competitive on the world markets.

The same question mark hangs over the exploitation of the large lead resources at Besaky, in North-Central Madagascar. The fact that the Mine Bureau has secured a Frs.300,000,000 allocation to evaluate local reserves bears witness to their calibre. Private ventures also have been taking a conditional interest in chromium orebodies.

A few hydro-electric projects, already at the blueprint stage, or even undergoing completion, are expected to remove in part this big bottleneck. The harnessing of the Mandraka waterfalls will boost fourfold the generation of hydro-electric power in Middle Madagascar. The first of two 11,000 kVA. sets was installed recently and will soon be followed by the second set.

Two dams at Tsiazompaniry have impounded an artificial lake of 250,000,000 cu. m. This has served both to increase greatly the production of electricity at the Antelomita hydro-electric plant, situated downstream 12 miles south-west of Tananarive, the capital, and to regulate the course of the erratic Ikopa river, saving this city from the menace of its periodic floods.

The Volobe hydro-electric plant, sited downstream from a dam harnessing the Ivondro torrent, will similarly be extended by another 5,700 kVA. set which will exactly double its capacity. The graphite orebodies and gold placers in the region of Tamataven in Middle-Eastern Madagascar, will be beneficiaries.

On the other hand, the mainstays of the local mining industry have still to labour under the handicap of high production costs, stemming in part from the use of gas-oil for fuel to extract and work products. This accounts for their inability to carve for themselves niches on the

Map by courtesy of the Office of the Premier of France. Photographs are by courtesy of the Ministry of Overseas France

Hand-picking of industrial garnet in Madagascar

world markets consonant with their sometimes very high grade. For instance, the country's piezo-electric quartz, although it can bear favourable comparison with the better Brazilian grades, has been largely unable to gain a foothold in the U.S.

Local deposits are very irregular and widely scattered all over crystalline terrains, from Vohémar in the north to Tsivory in the deep south, and in between at Minadrazo and Ramartina, in the mountainous heart of the country. Only one variety is encountered in each deposit. The crystals are often milky in colour and clouded. Limpid specimens are the exception and only a small percentage of the output can be used in electronics.

The crystals are carefully sorted on the spot, then sent for further examination to the central laboratory at Tananarive of the Société de Quartz de Madagascar, the sole local producer. They are shipped with identification tags giving the deposit, and even the geode of extraction, to the joint Paris laboratories of the Société de Quartz and the National Centre of Telecommunication Studies.

After exacting tests, the crystals are delivered with labels to specialist cutting shops which grind them into thin, polished and metallized flakes, fitted in between electrodes. They must pass a final inspection before disposal. Semi-finished blanks are also marketed. The Paris shops are equipped to handle only certain grades and to certain specifications.

Madagascar is the sole producer of this commodity in the French Union. Production has been nearly doubled to some 15 tonnes a year, half of which is absorbed by Metropolitan France herself. In addition, as many tonnes of low-grade casting and ornamental stones are produced, bringing in some 8s. per lb., as against the £10 to £20 fetched by the piezo-electric variety. Despite Brazilian competition, it is proposed to treble output in coming years. But the advent of man-made quartz, and a reduction in the use of the commodity accruing from better and more economical processes, may well interfere with the planned expansion.

A subsidiary of the Société de Quartz has secured a concession over the high-grade Antsefabositra asbestos deposits in Middle Madagascar. They carry sizeable reserves deemed capable of sustaining a yearly production of 2,800 tonnes. Thanks to a loan from FIDES, 150 tonnes of defibred asbestos will shortly be produced per year.

New Australian Barytes Treatment Plant

SUCH is the extent and potential of the barytes deposits mined by South Australian Barytes Ltd. at Oraparinna, in the heart of the Flinders Range, approximately 300 miles north of Adelaide, South Australia, that the South Australian Government have backed the company financially to design, erect, and operate a modern beneficiation and milling plant at Quorn, South Australia, which is about 200 miles north of Adelaide.

Treatment

At this new £A150,000 plant, which was placed in operation in December, 1957, the ore is primarily crushed with a gyratory crusher and subsequently beneficiated by gravity processes over jigs and Wifley tables. It is then milled to the degree of fineness required for the particular grade concerned and bagged in six-ply paper bags for delivery. The present Australian consumption of barytes is between 5,000 and 6,000 tons per annum and the new plant has a capacity for many thousands of tons more than this. The plant is also so designed that it can be easily expanded, if required.

Ore dumps to the extent of about 80,000 tons had been accumulated at the mine and these will be treated at the new plant along with run-of-mine ore. From the mine, the ore has to be carted to Hawker, whence it is transported by rail to the Quorn plant.

The company claims that, in post-war years, most of the first-grade barytes ore produced in Australia has come from their Oraparinna mine, which is the only major source of good quality material in the Commonwealth of Australia. The mine has, therefore, been developed on a long-term basis. At present, three levels are being worked and there is every indication that the orebody will continue indefinitely. Estimates by the Department of Mines, South Australia, show a proven 250,000 tons of ore and probably 500,000 tons.

Value of Domestic Supply

It is expected that the whole of the Australian demand for barytes will now be met from these domestic sources. In addition, the company hopes to export to New Zealand and is negotiating with a number of oil companies to supply material of a purity and grind suitable for use in drilling mud to the oil-producing regions of the Near East, Indonesia, the Philippines, and New Guinea.

A comparatively recent development in Australia is the use of barytes aggregate in shielding concretes used in nuclear reactors. The company has been the sole supplier of the barytes requirements of the Australian Atomic Energy Commission. The Commission has returned a report stating that the results obtained have been highly satisfactory.

For the paint, rubber and plastics industries three grades of barytes are currently being produced by South Australian Barytes Ltd. The head office of the company is at Adelaide, South Australia.

Microbes and Mining

INDUSTRIAL microbiology is mainly concerned with fermentation technology, particularly in its application to the production of industrial chemicals, cortisone, antibiotics and such important foodstuffs as vitamins and alcoholic beverages.

Some of the work of that branch of microbiology concerned with the deterioration of materials through the activity of micro-organisms is of interest to the mining industry, but the functions of the microbiologist are in general not of great interest to the mineral engineer.

However, the publication of recent research work in this field has served to underline the importance of bacterial agencies to the geologist in understanding the formation of ore deposits and to the metallurgist in the search for economic treatment methods for low-grade ores.

Bacterial Origin of Mineral Deposits

The importance of micro-organisms in rock formation has long been apparent and is evidenced by the large areas of the earth covered by limestone formations composed almost entirely of the skeletal remains of foraminifera. Diatomites, coral reefs and radiolarian cherts all demonstrate the ability of certain organisms to segregate calcium carbonate or silica from sea water. Both bacteria and algae are believed to play an important part in the deposition of calcite under certain conditions.

Bacterial agencies have also been put forward to explain the origin of bog iron ores and certain oolitic deposits and bacteria, algae and protozoa have been demonstrated to be capable of precipitating ferric hydroxide in brackish waters.

After years of acute controversy it is today generally accepted that oil has its origin in some organic source material, which was almost certainly the substance of lowly marine organisms. The subsequent processes by which this source material was converted to petroleum are thought to include anaerobic decomposition promoted by bacteria.

The generation of hydrogen sulphide by the decay of organisms is a well-known phenomenon and the oxidation of hydrogen sulphide to form sulphur by bacterial agency has been observed in hot springs. The activity of sulphur bacteria has been suggested as the origin of certain sulphur deposits.

In an attempt to make the U.K. independent of brimstone, mostly imported from the dollar area, intensive research is being directed towards using sulphate-reducing bacteria to produce hydrogen sulphide which can be easily converted to sulphur or sulphuric acid. A small pilot plant is at present in operation in this country.

Research work recently published indicates that a knowledge of microbiological processes may be important both to the geologist and the metallurgist. The following article discusses this importance and reviews the work of the U.S. Bureau of Mines as reported in "Industrial and Economic Microbiology in North America", published by the D.S.I.R., and similar work undertaken by the Kennecott Copper Corporation.

Bacterial Ore-Formation

The acceptance of most genetic theories of mineral deposit formation has been limited in the past by the inability of the protagonists of such theories to demonstrate that similar processes can take place in environments analogous to those in which orebodies were laid down. Nevertheless, microbial methods of ore formation have been suggested for such important base metal deposits as those of the Rhodesian Copperbelt and the Kupferscheifer of Central Germany and similar ideas are being asserted in relation to a growing number of syngenetic base metal deposits.

The work of the U.S. Bureau of Mines on microbial metallurgy, described in "Industrial and Economic Microbiology in North America", published by the D.S.I.R., shows how evidence supporting these theories is accumulating. A greater understanding of the processes of syngenetic ore formation must have a profound effect on the search for new ore deposits.

Microbial Metallurgy

The use of bacteria in extracting metals from ores is currently under investigation at the Eastern Park Experiment Station of the U.S. Bureau of Mines and elsewhere in the U.S.A. One possible method is the microbial conversion of relatively insoluble sulphide and oxide ores to more soluble sulphates which could then be more easily leached. A research group at Brigham Young University, Provo, Utah, has shown this process to be feasible. The organisms used in laboratory experiments were obtained from the leaching stream issuing from the waste dumps at Bingham Canyon, Utah, where this method of recovering copper from the waste rock of open-pit mining operations has long been used.

The waste rock which must be mined to extract the ore contains ore below the cut-off grade of 0.4 per cent Cu. About 120,000 tons per day of this material are mined and about 7,000,000 gals. of water per day are circulated through the dumps and emerge carrying 12 - 16 lb. Cu per 1,000 gals.

The appearance of copper in the leaching water has always been assumed to be due to the formation of sulphuric acid but is now thought to be largely due to microbial processes. On a laboratory scale it was found that the bacteria actively increased the rate at which pyrite is oxidized to soluble ferric iron and sulphuric acid by 20 times compared with a sterile control sample. Similar experiments with copper minerals and float concentrates yielded about 25 per cent of the copper in solution after three months. This work has since been repeated by the Bureau and about 70 per cent of the copper and iron contents of ores were extracted.

The Kennecott Copper Corporation has recently obtained a U.S. patent on bacterial leaching methods and it is claimed that in addition to copper recovery bacteria can be used to leach and recover molybdenum and zinc and to upgrade iron-chromite and iron-titanium by aiding in leaching out the iron. The patent specification describes a method of leaching in a series of vats with the bacteria-carrying solution being recycled for aeration and regeneration.

Present research indicates that a knowledge of bacterial processes can assist the geologist in the search for new ore and the metallurgist in recovering metals from the low-grade deposits which must inevitably be exploited on an increasing scale.

Combined Rock and Service Mine Hoist in Finland

A mine hoist with a three-phase induction motor, designed for fully automatic rock hoisting and push-button service operation, was commissioned in the summer of 1956 at the Lojo Kalverk limestone mine in Southern Finland. This hoist, manufactured by Allmanna Svenska Electrisca A/B (Asea), is responsible for the entire limestone and service transportation in the shaft. When used as a service hoist, operation is achieved by means of pushbuttons mounted on the shaft wall at the different levels. It has thus been possible to eliminate the trailing cable. The following article comprises extracts from a detailed description of the installation given in "Asea Journal", vol. 31, No. 1-2.

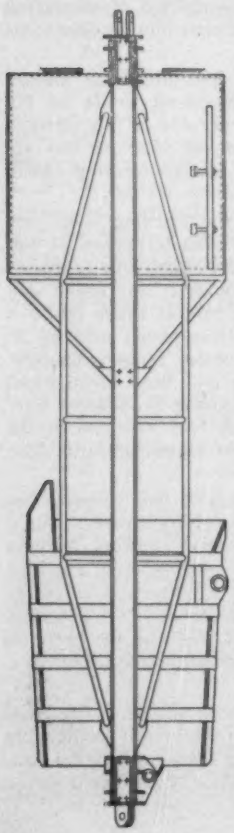
THE mine hoist, which is mounted at the top of the headframe, constructed according to the slide-casting method, is a friction-drive unit with four ropes. It is driven by a three-phase induction motor via a spring-mounted precision gear. A tilting skip with a cage at the top balanced by a counterweight is used for combined rock and service hoisting. The specifications are :

Net load	10 tonnes
Present shaft depth	227 m. (745 ft.)
Future shaft depth	427 m. (1,400 ft.)
Present hoisting speed	5 m./s. (16 ft./s.)
Future hoisting speed	7.5 m./s. (24.5 ft./s.)
Number of ropes	4
Rope diameter	28 mm. (1.1 in.)
Pulley diameter	2.4 m. (7.9 ft.)
Motor data	450 h.p., 750 r.p.m., 380 v., 50 cycles

Service hoisting takes place from three levels in the mine, while automatic rock hoisting is carried out from one loading station.

The Electrical Equipment

Thanks to the practical design of the electrical equipment, it has been possible to concentrate this to the hoist room and the brake room immediately below this. This layout has considerably simplified the wiring and reduced the length of the cables between the different components. In the hoist room is mounted the auxiliary apparatus driven from the hoist, as well as the control cabinet and manual operating gear. All the other equipment is located in the brake room. The equipment is made up of metal-clad units, assembled and wired up in the workshop. This considerably simplifies the erection work, since it is only necessary to arrange the cables between the different sets of apparatus.



A tilting skip with a cage on top is used for rock and service hoisting

The depth indicator is electrically driven from a selsyn transmitter located in the level selector. This depth indicator has a rough pointer which makes less than one revolution, and a vernier pointer which makes many revolutions during the hoisting cycle. The depth indicator is automatically synchronized at certain levels so that it always corresponds to the position of the conveyance in the shaft.

The lower half of the control cabinet contains a number of long-life contactors arranged on draw-out trucks, while the upper half houses the resistor grids. The heated air, which as a result of this layout does not come into contact with the contactors, is led away from the resistors through a special duct and is utilized for heating certain sections of the headframe. The resistors and contactors are wired up in the workshop with copper busbars, and consequently only one cable has to be led from the slip rings of the motor to the rheostat.

Two selector switches are placed on the front of the control cabinet, of which one has two positions, namely, manual operation, automatic operation; and the other three positions, namely, rock hoisting, service hoisting, inspection.

During manual operation, the hoist is operated by means of a controller and brake lever set up in front of the control cabinet. Manual operation is only intended as a stand-by service, being used, for example, in the case of special transportation or the inspection of the ropes or the shaft.

During automatic operation, service hoisting is controlled by means of pushbuttons in the shaft, while fully automatic hoisting is obtained for rock hoisting. Even when the selector switches are set to automatic rock hoisting, the hoist can be reconnected from the different levels in the shaft for service hoisting. Automatic resetting to rock hoisting takes place as soon as service hoisting has been completed. Change-over to service hoisting on the control cabinet need therefore only be carried out if rock hoisting is not required. Consequently, when rock hoisting is in progress, transportation of the personnel can be controlled direct from the mine shaft itself.

Rock Hoisting

The limestone is transported to the underground crushing station on a conveyor belt, about 600 m. (1,970 ft.) long. From the crusher the limestone then drops down into a pocket and is transported via an apron feeder to a measuring pocket, resting on hydraulic scales. When the discharge gate of the measuring pocket is closed and the scales indicate that the measuring pocket is empty, the apron feeder is automatically started up. After the fixed quantity of rock, 10 tonnes, has been fed down into the measuring pocket, the apron feeder is automatically stopped by the scales. When the skip reaches the loading position, a shaft limit switch is actuated and gives the opening impulse to the discharge gate of the measuring pocket.

Compressed-air-operated brake system for automatically operated mine hoist with three-phase induction motor

The discharge gate is operated by an electro-pneumatic valve and a compressed air cylinder. The discharge gate is closed immediately after the scales have indicated that the measuring pocket is empty. When fully closed, the gate actuates a limit switch which gives a starting impulse to both the hoist and the apron feeder. While the skip is being hoisted to the discharge station, the measuring pocket is filled again by the apron feeder. The skip is stopped at the discharge station by means of a shaft limit switch and is then automatically returned to the loading station after a predetermined time lag.

A control panel is placed in the loading station. On this panel is located a selector switch for changing over to manual operation of the measuring pocket. In this case, the apron feeder and the discharge gate are operated by pushbuttons. The hoist is also started by means of a push-button.

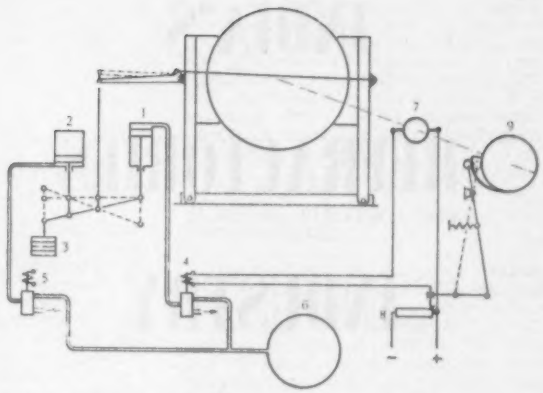
The risk of incorrect operations is eliminated by means of electric interlocking devices. It is thus impossible for the apron feeder to be started without the discharge gate of the measuring pocket being closed. As an extra precaution, the measuring pocket has been provided with level contacts which come into operation if any fault should arise on the hydraulic scales, stopping the apron feeder if the quantity of rock in the measuring pocket becomes excessive. The discharge gate of the measuring pocket can only be opened when the skip, before returning to the loading station, has been up to the discharge station.

Service Hoisting

During service transport, the hoist is operated by means of pushbuttons located at the different levels in the shaft. At each level there is set up a control panel. A change-over to service hoisting is carried out either with the aid of the selector switch on the control cabinet in the hoist room or, during rock hoisting, by means of pushbuttons in the shaft.

The sequence of operation is as follows. If automatic rock hoisting is in progress, this is indicated at all the levels by means of signal lamps for " Automatic " and " Rock ". If anybody wishes to use the cage, he can reconnect the hoist for service hoisting by depressing the pushbutton " Men hoisting required ". From the point of view of safety, it is essential that service hoisting does not take place in conjunction with a load in the skip. For this reason, the electrical reconnection for service hoisting does not take place immediately, but first after the skip has reached the discharge station and the time-lag relay for discharging has operated. At the same time, all the control devices for service hoisting in the shaft are connected up. This is indicated at the different service levels by means of the " Rock " lamps being extinguished and the " Men " lamps lighting up. When the pushbutton " Call " is depressed, the cage will immediately descend to that level from which the summons has been made.

The level selector is set to the desired level, and, after the passenger has entered the cage and closed the gates, the hoist can be started again by means of a handle inside the cage. This handle gives the starting impulse via a contact placed on the shaft wall. The starting contact is not actuated mechanically if the handle is operated while the cage passes a level at full speed. After the passenger has left the cage at the desired level and closed the shaft gates,



1. Service-brake cylinder
2. Emergency-brake cylinder
3. Brake weights
4. Service-brake regulator
5. Emergency-brake valve
6. Air receiver
7. Tachometer-generator
8. Potentiometer rheostat
9. Cam gear

he can make the cage available for others by depressing the " Available " pushbutton, or can reset for rock transportation by depressing another pushbutton " Continue rock hoisting ". If, however, during its passage the cage has been summoned to another level, it will immediately start to move towards this level after the " Available " impulse has been given, and the " Continue rock hoisting " impulse will not have any effect. The " Continue rock hoisting " signal will only actuate the hoist when there are no further impulses for service hoisting. The hoist conveyance will then immediately descend to the loading station, and automatic rock hoisting will commence again.

When the cage has arrived at one level, it is automatically blocked and thus cannot be started from another before it has been given the " Available " impulse at that level where it is located. The interlocking for the shaft gate is designed so that the hoist can be started only when all the shaft gates are closed.

Speed Regulation

Since the hoist is designed for combined rock and service hoisting, it must operate under widely varying load conditions. While being used for service hoisting, it may happen that a maximum unbalanced load on one occasion is to be driven upwards and on the next occasion downwards. For this reason, it is impossible to regulate the speed of the hoist merely by adjusting the secondary rheostat of the motor. The slip regulation is, therefore, combined with high-speed regulation of the mechanical brakes.

The brakes are operated with the aid of compressed air from a special compressor. Compressed air is led from the air receiver 6 to the service brake cylinder 1 via a sensitive electro-pneumatic regulator 4, which regulates the pressure in the service brake cylinder. This pressure is directly dependent on the current through the regulator coil. When the coil is de-energized, full pressure is applied to the service brake cylinder. However, when the current through the regulator coil increases the pressure drops, and at full regulator current the brakes are fully released. When the emergency stopping circuit is closed, the emergency brake valve 5 is energized, allowing compressed air to flow in through this valve to the emergency brake cylinder and raise the brake weights.

INDIA'S REFRACTORIES INDUSTRY

The refractories industry in India is the subject of a report by Katherine W. Bracken, American Consul in Calcutta, which has been reproduced by the Bureau of Mines, U.S. Department of the Interior, as *Mineral Trade Notes*, Supplement No. 52.

THE organized manufacture of refractories was introduced in India about the middle of the 19th century, when Burns and Co. began production on a small scale in the Raniganj coalfield area in West Bengal. At the present time there are 33 companies manufacturing refractories with a total combined capacity of 444,000 l.tons. The domestic iron and steel industry is the largest consumer.

Refractory Raw Materials

The principal refractory materials used include fire clay, quartzite, bauxite, magnesite, chromite ore, kyanite, sillimanite, zircon and graphite.

Large deposits of fire clay occur in the coalfields of West Bengal and Bihar and to a lesser extent in Orissa, Madhya Pradesh, Bombay, Mysore and Madras.

Quartzite suitable for the manufacture of silica refractories occurs in the Gaya and Mongyr districts of Bihar.

India is self-sufficient in bauxite. There are extensive deposits of this mineral in Bihar, Madhya Pradesh, Bombay and Madras, but at present supplies of suitable-quality material are drawn mostly from deposits in Madhya Pradesh. The total reserves are estimated at 250,000,000 tons.

Deposits of magnesite are found in Salem (Madras) and Mysore. A Geological Survey of India estimate places the reserves at 100,000,000 tons to a depth of 100 ft.

Chromite ore occurs in Mysore, Singhbhum (Bihar), and Keonjhar (Orissa). Reserves of all grades of chromite ore are estimated at more than 1,300,000 tons.

The principal deposits of kyanite are located in Singhbhum (Bihar) and Seraikella (Orissa). The Bihar reserves are estimated at 750,000 tons to a depth of 10 ft.

Deposits of sillimanite occur in Assam. The minimum reserves have been estimated at 250,000 tons.

Zircon has not as yet been used as a refractory in India. Its source is the monazite sands of Travancore (Kerala). Reserves are estimated by the Geological Survey of India at 2,000,000 tons.

Graphite is found in several places in India, the reserves being estimated at 74,000,000 tons, but it is has not been used to any appreciable extent in the refractories industry.

PRODUCTION OF PRINCIPAL REFRACTORY MINERALS IN INDIA
1952-56 (in l.tons)

Minerals	*1952*	*1953*	*1954*	*1955*	*1956*
Fire clay ...	118,999	83,613	92,644	87,485	n.a.
Bauxite ...	63,505	70,848	74,747	81,172	98,000
Magnesite ...	89,041	92,748	70,507	57,509	84,000
Chromite ...	35,187	64,770	45,507	89,349	54,024
Kyanite ...	26,882	15,374	42,330	11,741	14,870
Sillimanite ...	5,076	5,491	3,966	2,423	5,000

In 1957 the production of chromite increased by 25,856 tons to 78,542 tons.

In addition to being used within the country for manufacturing refractories, large quantities of magnesite, chromite, and kyanite are exported regularly to foreign countries. Exports of these minerals during the past five years were :

EXPORTS OF REFRACTORY MINERALS FROM INDIA
1952-56 (in l.tons)

Minerals	*1952*	*1953*	*1954*	*1955*	*1956*
Magnesite ...	41,278	42,523	25,362	24,367	34,546
Chromite ...	6,211	16,091	23,866	48,800	41,866
Kyanite ...	25,442	14,875	22,919	25,837	26,564

Quotas for kyanite were recently issued to shippers and mineowners equal to their best year's exports during 1954, 1955 and 1956. It has since been decided to include 1957 in the basic period for calculation of quotas for 1958. This policy is also applicable in respect of sillimanite ore.

Expansion of Production

Although India has abundant resources of refractory raw materials, there is as yet no scientific basis for the refinement, processing and supply of such materials. The Central Glass and Ceramic Research Institute is studying the problem of raw material standardization.

During the current year the consumption of refractories is expected to total 567,000 tons. Total annual requirements of refractories by the end of the Second Plan in 1961, at first estimated at 800,000 tons with an installed capacity of 1,000,000 tons, were later revised to 1,000,000 tons with an installed capacity of 1,250,000 tons. The actual annual capacity is 440,000 tons. To meet this deficiency, the expansion programmes of eight existing factories and the installation of 10 new units have been approved by the Government of India. Among the manufacturers currently engaged on major expansion projects are The Tata Iron and Steel Co. at Belpahar, Orissa Cement Ltd., Burn and Co., and the Kumarduhubi Fireclay and Silica Works.

A new development in the Indian refractories industry is the manufacture of mica insulating brick. The Central Glass and Ceramic Research Institute, Calcutta, conducted research on this problem utilizing the waste mica available in India after proper beneficiation. On the successful completion of this research the process was patented. A Calcutta company has obtained the patent for purposes of commercial exploitation and has a licence to make 600 tons of mica insulating brick per year.

Another development is the intention of the Government of India to create a public sector in the refractories industry. The government has under consideration a plan for establishing a refractories plant under the National Industrial Development Corporation for the manufacture of special refractories such as graphite, silicon carbide and electrocast, the manufacture of which has not yet been undertaken in India mainly because of the limited demand and the complicated technical processes involved. With the gradual expansion of consuming industries, demand for some of these items might increase sufficiently to render manufacture economic.

Technical Briefs

Research on Rare Earths

Development by the U.S. Bureau of Mines of a simple and accurate method for using X-ray spectroscopic equipment to analyse rare earth ores, metals, and compounds, has removed a major barrier to research on a group of little known metals of growing military and industrial importance.

The new technique, reported by Lytle, Botsford and Heller, makes it possible to analyse forty samples for seven elements each in a single day. By contrast, only about a dozen samples could be analysed in a week by methods formerly used. The development promises to speed up the finding of more efficient and economical methods for separating and purifying the individual rare earths and determining their properties.

The rare earth elements are so similar that they defy conventional chemical analysis, yet knowledge of which ones are present in a given sample is essential to metallurgical studies.

The method was developed at the Bureau's Rare and Precious Metals Experiment Station, Reno, Nevada, primarily for analysing samples of bastnaesite, monazite, euxenite, gadolinite, and yttrofluorite.

The report explains that the designation "Rare Earths" is misleading, since the metals grouped under it are relatively abundant. Formerly the United States was considered deficient in these, but around 1950 the Bureau and the Geological Survey established the presence of extensive placer deposits of monazite and euxenite and lode deposits of bastnaesite.

A copy of the report, R.I. 5378, "Emission Spectrographic Analysis of Bastnaesite Rare Earths", can be obtained from Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number and title.

RUSSIAN PROCESS FOR ZINC RECOVERY

A new continuous process for the production of zinc metal has been developed in Russia.

The process is said by the scientists responsible for developing it to give an extraction rate more than twelve times greater than that which can be obtained with conventional batch production methods.

The operation of the process depends on the use of a continuous electrolytic technique. The zinc is produced during processing in the form of a long unbroken ribbon of metal.

The production apparatus is so designed that this long ribbon of zinc metal is automatically removed from the cathode electrodes on which it is formed. Indeed, the whole extraction process is said to be automatically controlled from the commencement of the operation.

Although the process has been developed in the first instance especially for the production of zinc, it is expected that it will prove possible to adapt it for use in the electrolytic production of other kinds of metals.

STRESS IN ELECTRODEPOSITED NICKEL

Although the addition of stress reducing agents has been practised for many years on an *ad hoc* basis, the mechanism of stress formation and the mode of action of stress reducing media are at present imperfectly understood. The work, described in a paper by Hoar and Arrowsmith, was planned to provide a more fundamental approach.

The tests were made with an unmodified Watts type solution, and with basis solutions of that type containing varying concentrations of naphthalene-1.3.6-trisulphonic acid, naphthalene-1.5-disulphonic acid, benzene-*m*-disulphonic acid, toluene-*p*-sulphonic acid and toluene-*p*-sulphonamide. The anodes used were nickel strip.

Measurements of stress were made by means of an instrument developed by the authors which enables readings to be taken at any stage during the growth of a deposit.

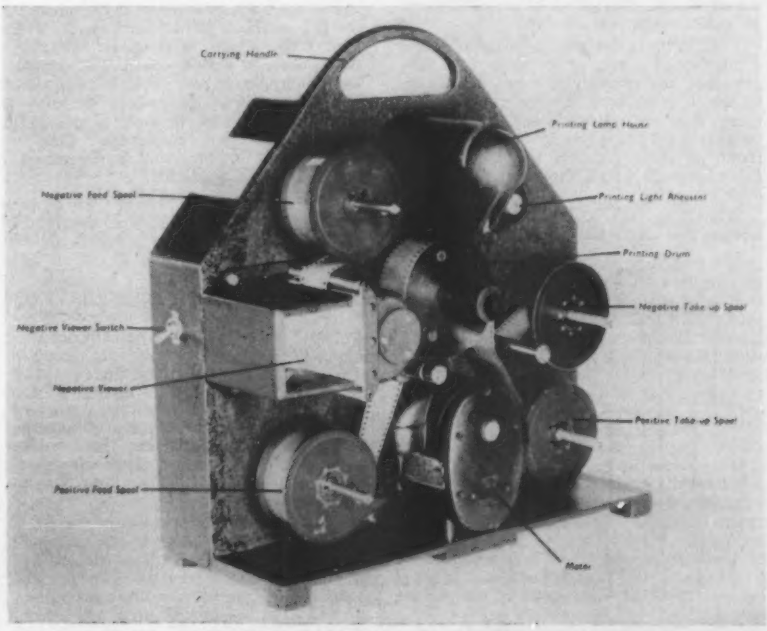
Curves showing variation of average "instantaneous stress" (the stress in any small increment of thickness), as a function of the concentration of the stress reducing agent in the electrolyte, revealed relationships from which it is concluded that instantaneous stress, as measured during deposition, is not a completely accurate value of the final stress associated with the deposit, and that production of stress is not an "instantaneous" process coinciding in time with the formation of the lattice. It is suggested that routine measurements should be made at standard times after deposition is complete.

PUMPING FLUXED COPPER CONCENTRATE

The usual practice in copper smelting is to add crushed silica or highly siliceous mine ore as a fluxing agent to produce a suitable slag, but at Magma Copper's smelter, at Superior, Arizona, the practice of using crushed silica has been abandoned in favour of mixing a high-grade silica concentrate directly with the copper concentrate at the mill and pumping the mixture to the filter plant at the smelter.

The flux is prepared by floating pyrite from a portion of the mill scavenger tailing in a special circuit installed at the mill so that the resulting tailing is suitable for fluxing. This circuit comprises a cyclone to remove a great deal of the − 200 mesh fraction followed by flotation of the underflow to remove the pyrite. The resulting product assays 70 per cent silica, 14 per cent iron, and 0.14 per cent copper, and the iron content is composed principally of hematite and magnetite. It is claimed that the change has resulted in better reverberatory operation due to more uniform slag composition, as there is less segregation in the charge.

First details have been released of a new and inexpensive continuous printer for 35 mm. or 70 mm. negative film, designed by Fairey Air Surveys Ltd. Easily portable, the machine is being marketed for printing record traces and aerial films and for producing duplicate negatives by using positive stock. Adapting the machine for either size of film takes only a few moments while the appropriate printing drum is fitted to the centre shaft and the guide plates on the feed side are adjusted to the required width. The machine prints lengths of up to 100 ft. maximum of film at a constant speed of 9 f.p.m and the exposure is adjusted by varying the intensity of the printing lamp



Machinery and Equipment

Wedge-type Clamps for Shaft Cables

In January, 1956, W. Marriott presented a paper to the A.M.E.M.E. on "The Installation and Removal of Shaft Cables". To those closely associated with the mining industry in South Africa, there are aspects in Mr. Marriott's paper that are of considerable interest. These were described by J. A. Morrison, a director of the Simplex Electric Co. (S.A.) (Pty.) Ltd. in *The Mining Electrical and Mechanical Engineer*, Vol. 38, No. 451.

In South Africa, the majority of the shafts are vertical, with a number well over a mile in depth. Sinking costs are heavy and it is therefore important that the diameter of these shafts is kept to a minimum. Another aspect peculiar to South African mines is that the hoisting speeds are high and substantial quantities of rock are delivered to the surface every hour. Therefore, when designing clamps to carry shaft cables, one is confronted, not only with the problem of compactness, but also with the speedy installation or changing of cables.

Generally speaking, it has been found that the cleat type of clamp consisting of the specially shaped wooden flanges that are bolted together to hold the cable has not been completely satisfactory.

Some years ago, a multiple clamp was developed which consisted of a cast-iron plate shaped in a series of half-circles, through which protruded ½ in. steel bolts. The cables were clamped to the plate by saddles which were fitted over these bolts and secured with nuts. Unfortunately, the saving in space by handling more than one cable was offset by the fact that screwing up of the nuts was a lengthy business, and once they had been in a position for a few months they rusted up.

Recently, a wedge-type clamp has been introduced that is considered to provide a substantial advance in the field of shaft cabling. Its application is both safe and versatile, and the speed of installation is an outstanding feature.

The clamp is designed to accommodate a number of cables of the same or different sizes, and consists of a cast-iron body in which there is a number of open recesses that are oblong shaped and taper on two sides from top to bottom. In the front of these recesses are a series of gates through which the shaft cables are inserted.

Straddling the cables are cast-iron wedges that carry similar taper and shape to the recesses on their outer surfaces, with the inside faces contoured to fit the diameter of the cable they are designed to accommodate.

At this stage certain advantages in the design of this clamp will be apparent, namely: multiple handling of power, signal, and telephone cables, individually or collectively; neat and compact installation; the quickness and simplicity of securing the cables means considerable saving in installation costs; the firm and positive grip prevents slippage. Any pull on the cable merely brings the wedges deeper into the clamp; the clamp can be so designed that shaft-sinking cables can be replaced by permanent ones simply by changing the type of wedge, and being made of a strengthened cast iron the clamps are less liable to become corroded.

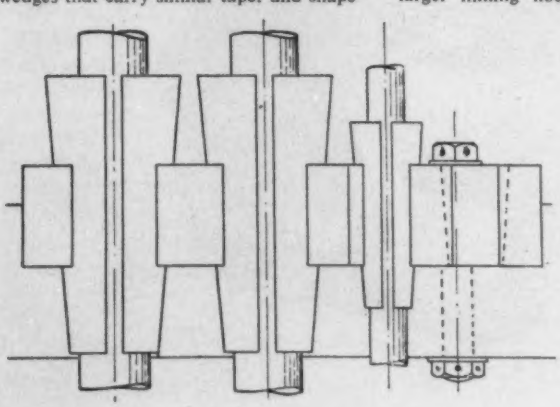
The installation procedure for power cables is often modified to suit circumstances, but the following is generally accepted as the method of clamping the cable.

The buntons, brackets, R.S.J.s, etc., are pre-drilled on the surface to suit the fixing centres of the clamps. When located during the sinking of the shaft, the bodies of the clamps are fixed into position, usually with ¾ in. steel bolts.

Before the actual cabling commences, the electrical engineer determines the lengths to be used by taking into consideration the amount to be allowed in each cable pocket for jointing. This length is then wound on a drum and loaded on the bottom deck of a three-compartment cage or skeleton platform. The cage crew consists of three men, who are positioned thus: bottom deck, one to control the pay-out of the cable and to give the movement signals; centre deck, one to locate the cable in the clamp gate, and top deck, one to tap home the wedges on either side of the cable.

Leaving sufficient cable for jointing, the first clamp is located at the entrance to the surface cable duct and, when ready, the signal is given to lower the conveyance at a slow speed. The location and clamping of the cable is continuous until the first cable pocket or level is reached, when the balance is pulled in and secured. The conveyance then returns to the surface and a replacement drum of cable is loaded.

Since its introduction about a year ago, this clamp has been adopted by all the larger mining houses in South Africa. Not only has it been found that the initial capital costs are lower, but the time saved in installation and replacement is so great that some of the older mines are pulling out their cleats and replacing them with wedge-type clamps.



Typical arrangement for wedge-type clamps

CLEARING BALL MILL DISCHARGE OF TRAMP METAL

An ingenious magnetic separator for removing broken balls and steel scrap from the ball-mill discharge is now in use at the Nchanga Mine, Northern Rhodesia. The separator, designed by Allenwest (S.A.) (Pty.) Ltd., comprises a non-magnetic drum, fitted with steel spikes on the outside, which rotates in a curved launder carrying the pulp. This launder is also made of non-magnetic material and the bottom is concentric with the drum surface, the axes of rotation being parallel to the flow so that the steel spikes are immersed in the pulp stream.

Two electro-magnets are mounted beneath the launder so that magnetism is induced in the spikes. Any iron is therefore attracted to them and is pulled up the side of the launder out of the pulp and released to fall outside the launder as the spikes pass out of the magnetic field.

The separator is said to be efficient, although wear on the spikes is considerable and the advent of a simple means of removing such "tramp" fragments of steel is certainly likely to be welcomed by mill operators, as they can cause serious damage to pumps and cyclone linings and possibly block the discharge of a small cyclone.

IDLER COVERING TUBING

A better method of covering idlers for conveyors, which is said to be superior to using sheet cemented in place or vulcanized covering, consists of using a rubber sleeve. This is difficult to apply, but a newer procedure has been developed involving closing one end and expanding the sleeve by the admission of compressed air as it is forced over the roller. In this way it is easy to fit and finally the ends should be turned back for a short distance and cement applied. The method cannot be used for neoprene tubing, as it tends to stretch slightly under tension.

CONVEYOR FOR NEW SWEDISH STEELWORKS

A double conveyor belt installation for ore, coal, and limestone, the belts of which are altogether more than three miles in length, is at present being constructed for the new Oxelösund steelworks belonging to the Grängesberg-Oxelösund Co. It is being built by Nordströms Linbanor, well-known Swedish constructors of conveying machinery; will cost about kr. 30,000,000 (£2,070,000) and will be completed in about eighteen months.

The ore, which arrives at the railway storing yards of Oxelösund from the company's own inland mines—as well as the other raw materials necessary for steel production unloaded on the nearby quays—will be conveyed over an overhead bridge structure to the ironworks. The capacity of the six miles of conveyor belting, carried on 15,000 rollers, is to be 1,100 tons per hr. There are to be some viaduct structures.

MINING MISCELLANY

On October 9, Commodity Exchange Incorporated of New York will celebrate its 25th anniversary.

★

In the West Kimberley goldfields, Australia, a temporary reserve to prospect for diamonds has been granted to the Melbourne firm of Whiteacres Estates Pty. The area covers 10 sq. miles.

★

Two geologists of the University of British Columbia have developed a prospecting kit no bigger than a lunch basket, which may guide Canadian mining companies to new deposits of copper.

★

Poland may collaborate with India in the exploitation of copper mines at Khetari in Rajasthan, it is reported in New Delhi. A team of Polish experts is expected soon to discuss the technical and financial aspects of the project.

★

Bureau Minier de la France d'Outre-Mer, the government-sponsored exploration concern, has been awarded an exclusive permit covering 2,615 sq. km. in Mauretania for exploration of ilmenite, zircon, rutile, and garnet.

★

New mining concessionaires are exempt from income tax for six years by an amendment to the mining law passed during the first quarter of 1958, by the Government of Ethiopia. Administrative channels for granting concessions have also been simplified.

★

At New Hosco Mines, Mattagami property drilling has established that the copper orebody extends westward for at least 200 ft. One hole cut mineralization between 377 and 443 ft. The better copper intersections gave 1.8 per cent copper over 13 ft. and 0.34 per cent over 30 ft. Good zinc values were also found.

★

A U.S. metallurgist has arrived in Nigeria to study the possibility of producing crude pig iron from Nigerian iron ore and coal. Workable iron ore deposits are known to exist at Lokoja on the Niger and at Enugu where low-grade quality coal has been mined for a number of years. The coal mining industry exists at Enugu almost exclusively to meet the needs of the railways, and there has been concern over its future as the railway is turning more and more to diesel traction.

★

An important technical discovery relating to the smelting of ironsand, coupled with the registration today of two new companies—Electric Steel Co. N.Z. Ltd., and N.Z. Industrial Investments Ltd.—are significant moves leading to the establishment of a N.Z. iron and steel industry. A new technical process has been evolved by Mr. W. R. B. Martin, a research scientist, who has shown that Benhar coal—previously thought to be a relatively worthless type of wet coal—can be used by means of a smelting process to provide the necessary carbon element essential in electro-smelting of steel. It is understood the process involves the mixing of coal with ironsand ore when it is being electrically smelted. It will not be used as fuel. There is a large field of this coal near Dunedin where it is likely the industry will be established. The formation of the two companies enables formal agreements to be concluded in connection with the industry.

PERSONAL

Mr. W. J. C. Richards has resigned from the board of the Bremang Gold Dredging Co. Ltd.

★

Mr. R. H. Landman has been appointed to the board of directors of Camp Bird Ltd.

★

Mr. T. V. Baines has been appointed consulting geologist to the International Nickel Co. in Africa. Mr. Baines, a graduate in geology and chemistry of the University of South Africa, has been associated with International Nickel since 1951.

★

Mr. G. M. Hama, chairman of the Committee on Industrial Ventilation, City of Detroit Department of Health, visited Hayle in Cornwall on his recent trip to Europe, to examine the possibilities of the Dustuctor Low Volume High Velocity exhaust system, developed and marketed by the Holman group.

★

Mr. G. Hunt, assistant general manager of Consolidated Diamond Mines, Oranjemund, South Africa, has been appointed general manager to the Williamson Diamond Mine, Tanganyika. Mr. D. Walker, of Oranjemund, becomes Williamson's chief engineer, and Mr. E. C. Davies replaces Mr. Hunt as assistant general manager of Consolidated Diamond Mines.

★

Now on a visit to Great Britain are Mr. M. P. J Hunter, chief assistant to the personnel manager at Mufulira Copper Mines, and Mr. A. Johnston, chief personnel officer of Roan Antelope Copper Mines. They are members of a party of nine executives from abroad who are taking part in an eight-week "group tutorial" organized by the Industrial Welfare Society. The aim of this is to facilitate the exchange of experience between people of different countries by giving them a first-hand insight into personnel, welfare, and training schemes operating in the more progressive industrial organizations in Britain. The other executives in the group are two Nigerians, a Pakistani, a Briton from British Guiana, an Indian from Uganda, and a Briton and an Iraqi from Iraq.

CONFERENCES AND EXHIBITIONS

A mobile exhibition featuring new products from Dowty Mining Equipment Ltd., one of the Dowty group of companies, is making a four-months' tour of Britain's coalfields. Accommodated in a stripped 42-seater coach, and a 5-ton lorry with trailer, it is giving demonstrations in pit yards primarily for Coal Board officials and miners.

★

The Institution of Mining and Metallurgy has issued its second circular on the Symposium on the Future of Non-Ferrous Mining in Great Britain and Ireland. The Symposium will take place on September 23 and 24, at the Federation of British Industries, London. The twenty-four papers to be contributed will be circulated beforehand as pre-prints to all Symposium members, and will form a basis for discussion. A projector to show slides, size 3¼ in. sq., mounted, will be available.

★

Mr. A. Gray, Ph.D., M.I.M.M., Mining Adviser, U.K. Atomic Energy Authority, will deliver the fourth Sir Julius Wernher Memorial Lecture on "The Future of Mineral Exploitation", on September 22, at the Royal Institution, Albermarle Street, London.

★

The National Coal Board has accepted an invitation from the Polish Minister of Mining and Electrical Energy to attend an International Congress on Reconstruction and Development of New Mines, to be held in Warsaw from September 15 to September 20, and to make a number of visits to Polish collieries. In April, 1957, a party of Polish technicians visited Britain. The delegation will be led by Mr. H. E. Collins, C.B.E., the N.C.B. member responsible for production and reconstruction.

COMPANY EVENTS

As from September 3, 1958, the address of the British Bureau of Non-Ferrous Metal Statistics will be 6 Vicarage Road, Birmingham 15. The telephone number and cable address remain unchanged.

★

On September 8, 1958, the offices of the Secretariat of the International Wrought Non-Ferrous Metals Council will be moved to 6 Bathurst Street, London, W.2. The new telephone number is Paddington 7465-6-7, and the telex number 23556.

CONTRACTS AND TENDERS

The General Electric Co. Ltd. has recently received orders for two large electrically-driven winding engines for the North-Eastern Division of the National Coal Board. The first contract is for a 16 ft. dia. x 5 ft. wide double-drum, single-clutch winder driven through single-reduction gears by an a.c. motor of 2,100 h.p. running at 407 r.p.m. The equipment is for installation at Silverwood Colliery, West Shaft, and will be used as a service winder operating from a maximum depth of 2,458 ft. This contract follows the recent installation and commissioning of the main coal winder at Silverwood Colliery, East Shaft.

G.E.C.'s second contract covers supply of a winding engine for Barnburgh Colliery No. 5 Shaft. This will also have double drums each 16 ft. dia. x 5 ft. wide. The drive will be transmitted through single-reduction gears from an a.c. motor of 2,900 h.p., running at 475 r.p.m. When commissioned, the winder will raise men, materials, and dirt from a maximum depth of 2,571 ft. Both winders are for operation from a 3.3 kV. supply. Power for the equipment at Silverwood West Shaft will be fed through a 2,500 kVA., 11 kV./3.3 kV. step-down transformer, and at Barnburgh No. 5 Shaft through a 3,500 kVA., 11 kV./3.3 kV. step-down transformer. Each equipment will incorporate the latest G.E.C. scheme of dynamic braking and will have mechanical brakes of the company's well-proved air/oil rapid pressure-operated type.

Metals and Minerals

Europe's First Beryllium Plant

It has been announced that the Metals Division of Imperial Chemical Industries Ltd. will establish the first plant in Europe for the production of beryllium metal in wrought forms. The plant is designed to produce semi-fabricated forms of the metal, such as rod, tube and plate, and finished machine parts.

The capacity of the plant has not been revealed, but output might be of the order of 10,000-15,000 lb. of beryllium metal annually. It is understood that the capacity could be considerably extended when required. The cost is expected to be somewhere between £1,500,000 and £3,000,000, a beryllium plant being necessarily more expensive than other metal-producing plants because beryllium is poisonous when breathed through the lungs and special manufacturing precautions have therefore to be taken.

The plant is expected to come into production at the end of 1959. Its first task will be the execution of a production scale contract placed with I.C.I. by the U.K. Atomic Energy Authority as part of a development project. Spare capacity may later find additional outlets for this metal, in which aircraft and missile designers are showing considerable interest.

Beryllium's importance in the nuclear field stems primarily from its low thermal neutron absorption cross-section, which allows this metal to be employed in the manufacture of many different types of reactor hardware. Interest in beryllium as a nuclear engineering material has been intensified by the need for a metal which will perform satisfactorily at the higher operating temperatures envisaged in advanced nuclear reactors of the Calder Hall type.

In the third group of nuclear power stations to be built in the U.K., it is desired to increase the temperature of the fuel elements from 400 to 600 deg. C., thereby reducing the capital cost of the power output. Beryllium's melting point is nearly twice that of magnesium, which is 650 deg. C. Using beryllium in the reactor core has the primary advantage of conserving neutrons and giving uniform flux densities. These factors make the reactor smaller.

In the U.K. the development and production of beryllium metal are being undertaken by Murex Ltd. A pilot plant for the production of beryllium metal is being operated on behalf of the Atomic Energy Authority by Consolidated Zinc.

Being only half the atomic weight of aluminium, beryllium is a potential competitor of aluminium as a lightweight metal for various industrial applications.

Aircraft designers are interested in beryllium as being virtually the only metal that will perform at high strength above 1,000 deg. F. Moreover, a plane made mostly of beryllium would weigh about half as much as today's basically aluminium plane. Beryllium is also one of the most promising metals for missile nose cones and a possible answer to the problem of re-entry into the earth's atmosphere.

In our issue of August 8, page 154, it was reported that the first privately owned plant in the United States for the fabrication of metallic beryllium had been placed in operation by the Beryllium Corp., and that a record order for fabricated beryllium, worth $1,200,000, had been placed by the Belgian Nuclear Planning Centre with the Brush Beryllium Co., of Ohio.

ALUMINIUM PLANTS REOPENED

The upturn in the U.S. economy, which appears to be slowly gathering momentum, has already been reflected by the reopening of aluminium potlines that were closed down earlier in the year. Reynolds Metal Co. is reopening immediately one of two potlines at its Jones Mills, Arkansas, reduction plant, which were shut down in May. The company's production rate has been increasing gradually since the low point of 73 per cent in July. The new move will result in the recall of 150 workers and will raise Reynolds' overall primary aluminium production in September to 83½ per cent of total capacity of 601,000 tons annually.

Kaiser plans to reopen an aluminium potline at its Mead, Washington, reduction plant. Six out of eight potlines will then be in operation. The reopening will add 22,000 tons of primary aluminium to the company's annual production rate of 430,000 tons, bringing output up to about 84 per cent of capacity.

★

In the U.K. the free aluminium price seems to have flattened out, following the decidedly steadier tone of the market. Russian metal of minimum 99.5 per cent is still indicated at about £170 per ton c.i.f. U.K. Putting Russian metal on to a delivered basis, and taking into account the "loyalty" discount of £3 12s. allowed on the present Canadian contract price of £180 per ton delivered, the difference is probably not more than between £3 and £4—certainly much less attractive to buyers than the £10 or more discount-free metal commanded not long ago. Incidentally, it is reported that Russia is virtually unable to offer much metal before October-November.

NICKEL COMPANY FORMED

A new mining company, the North American Nickel Co., has been formed. Incorporated in Delaware, it combines the resources of St. Joseph Lead Co., Bunker Hill Co., Falconbridge Nickel Mines Ltd., and Blyth and Co. The first three companies each hold a 30 per cent interest in North American Nickel, while Blyth holds the remaining 10 per cent. It is understood that the new mining company has not as yet made any bids on properties, but that it has several sites under consideration, according to trade sources. Another possibility is that the new company will bid for the government-owned nickel plant near Nicaro, Cuba, with the idea of selling the nickel produced in Europe.

Of the four companies participating in North American Nickel Co., only Falconbridge is a nickel producer. It mines nickel, copper and cobalt in Canada and smelts nickel in a Falconbridge, Ontario, plant, shipping the matte to a refinery owned by a wholly owned subsidiary in Norway. Blyth and Co. is an investment banking firm in New York.

AUSTRALIAN URANIUM CONTRACTS

Negotiations have been completed for the sale to the U.K. Atomic Energy Authority of uranium concentrates to be produced from the South Alligator River area of the Northern Territory. Contracts to be signed between United Uranium N.L., South Alligator Uranium N.L., and the U.K. Atomic Energy Authority provide for the sale of uranium oxide to a total value of over £6,000,000. These arrangements will be of great importance in developing the South Alligator uranium field and represent a major contribution to the development of the Northern Territory.

NEW TITANIUM SHEET

The Titanium Metals Corp. of America has announced a new titanium sheet capable of withstanding the extreme heat and stress met by aircraft flying at 2,100 miles an hour. The company claims that the sheet can withstand the pressures of more than 100 tons per sq. in. which result from stresses at that speed. The sheet alloy consists of titanium, 4 per cent aluminium, 3 per cent molybdenum, and 1 per cent vanadium.

This report follows closely on the announcement by the Crucible Steel Co. of America of a new "beta" titanium alloy said to hold great promise for applications in guided missiles (*vide The Mining Journal*, July 11, 1958, page 48).

Viewed in conjunction, these two developments are an encouraging indication of the progress achieved by the titanium industry in widening the potential outlets for a new engineering material of great value, which is experiencing a temporary setback. In the United Kingdom, as well as in the United States, the development of new materials and applications is vigorously proceeding, and apparently with considerable success.

★

A new titanium tetrachloride plant at Ashtabula, Ohio, U.S., has been bought by the Mallory-Sharon Metals Corporation from the Stauffer Chemical Co. It has capacity for producing enough raw material to make about 5,000 s.tons of titanium sponge yearly. The Mallory-Sharon organization is owned jointly by the Sharon Steel Corporation, P. R. Mallory and Co. Inc., and National Distillers and Chemical Corporation.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The main item of news to reach the market during the week was the announcement by the Board of Trade last Friday night that the imports of tin from Russia were to be subject to quota as from August 30, and that the size of this for the first three months had been fixed at 750 tons: also that imports of the metal originating in or consigned from other countries in the Sino Soviet *bloc* would be subject to individual licensing. There was a provision in the announcement which permitted the entry into this country of any tin already shipped from Russia with Bills of Lading dated earlier than August 29 but that any tonnage so admitted would be counted against the quota.

TIN MARKET'S REACTION

The immediate reaction on the Singapore market of last Saturday was very small and it was not until the London market opened on Monday that the price of tin moved up sharply, but when the Singapore market failed to follow the advance on Tuesday (the market was shut on Monday) and people had had time for second thoughts, the price commenced to decline and was soon down to within £5 of the buffer scheme support price. The main reason for the market's behaviour seems to be that the majority of dealers feel that the action taken by the Board of Trade can only be effective if all the major consuming countries of the world impose similar restrictions on the imports of Russian tin as otherwise it will be a relatively easy matter for the Russians to sell their tin in other markets and the metal so displaced will then appear on the London market.

From the London Metal Exchange's point of view, any such action as has been taken must be deplored on the grounds of interfering with the free function of the futures market but in this case the necessity for some further action to bolster up the International Tin Council is clearly understood, although the majority opinion is that the very fact of having to take such drastic steps is a further pointer to the probable break-up of the scheme. There is a minority, however, who consider that the scheme was about to succeed in any case and that the imposition of the import quota only brings nearer the day when the buffer stock manager will be able to start liquidating some of his stocks.

Whichever party proves to be right, there is no doubt but that the history of the International Tin Council must prove a valuable object lesson to those bureaucrats and others who are toying with the idea of trying to introduce similar schemes for other non-ferrous metals.

The Straits Trading Co. reports that during August 902½ tons of tin were shipped from Singapore and 3,102½ tons from Penang; the latter figure shows little variation from the July shipments but the shipments from Singapore are almost double the July figure.

On Thursday morning the Eastern price was equivalent to £747½ per ton c.i.f. Europe.

COPPER RECOVERS

The copper market has made a slow but steady recovery from the low point touched after the announcement of the failure of the Seaton Plan, in spite of a reduction in the customs smelter price of ½ c. per lb. to 26 c. per lb. and a reduction of ½ c. per lb. in the intake price for scrap. This latter quotation has now been raised again by ½ c. per lb. following the strength in London. There are continued rumours of possible industrial trouble in the Copperbelt in Rhodesia, but the majority consider that any serious strike action is unlikely. The main factor in the market has undoubtedly been the reluctance of sellers due to the potential dangers in the Far Eastern situation. Should this position quieten down then copper prices can be expected to fall in view of Kennecott's extra output and lessening industrial activity in the U.K. and in Europe. The outlook was not helped by Phelps Dodge's announcement that with immediate effect they were increasing the production in their Arizona mines by 3,500 tons of copper per month. Opinions differ as to the most likely course of British and European output but everyone seems agreed that the rate of increase has been reduced to a very small fraction.

DULL LEAD-ZINC MARKETS

As has been the case for so long, the lead and zinc markets have been very dull and inactive with the main talk now being centred on the possibility that the U.S. President will impose fairly stiff additions to the existing tariffs, with the consequence of more metal finding its way to the market. It is believed, however, that any action will be delayed until after the United Nations conference which is being held in London next week to discuss the possibilities of governments' intervention in the marketing of copper, lead and zinc with a view to ironing out "excessive fluctuations". It is interesting to note that this conference probably stems from moves made by the French and Italian Governments towards the stabilization of metal prices some years back, when the avowed object was to keep prices down. Now when at last the period of bureaucratic gestation has passed the conference will be discussing the very same question but with the object of keeping prices from going too low!

Closing prices and turnovers are:

	Aug. 28		Sept. 4	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£201	£201½	£206½	£206½
Three months	£201½	£201½	£206½	£206½
Settlement	£201½		£206½	
Week's turnover	8,400 tons		6,600 tons	
LEAD				
Current ½ month	£69½	£69½	£71½	£72
Three months	£71½	£71½	£72½	£73
Week's turnover	6,925 tons		3,350 tons	
TIN				
Cash	£730½	£731	£730	£730½
Three months	£730½	£731	£731	£731½
Settlement	£731		£730½	
Week's turnover	575 tons		1,160 tons	
ZINC				
Current ½ month	£63½	£63½	£64½	£64½
Three months	£64½	£64½	£65	£65½
Week's turnover	6,900 tons		4,025 tons	

LONDON METAL AND ORE PRICES, SEPT. 4, 1958

METAL PRICES

Aluminium, 99.5%, £180 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Crude (70%) £190 per ton
Ore (60%) bases 19s. 6d./20s. 6d. nom. per unit, c.i.f.
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 10s. 0d. lb.
Cerium (99% net), £16 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d. lb.
Cobalt, 16s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 8d. per gram
Gold, 250s. 7½d.
Iridium, £20/£22 oz. nom.
Lanthanum (98/99%) 15s. per gram.
Manganese Metal (96% - 98%) £290
Magnesium, 2s. 5½d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £17/£18 oz. nom.
Osmiridium, nom
Palladium, £5/£5 15s.
Platinum U.K. and Empire Refined £23 5s. oz.
Imported £19 0s./£21 0s.
Quicksilver, £79 0s. ex-warehouse
Rhodium, £40/£42 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 50s. 0d. per lb.
Silver, 75d. f. oz. spot and 74½d. f'd.
Tellurium, 15s./16s. lb.

ORES AND OXIDES

Bismuth		30% 5s. 0d. lb. c.i.f.
		20% 3s. 3d. lb. c.i.f.
Chrome Ore—		
Rhodesian Metallurgical (semifriable) 48%	(Ratio 3:1)	£15 15s. 0d. per ton c.i.f.
" Hard Lumpy 45%	(Ratio 3:1)	£15 10s. 0d. per ton c.i.f.
" Refractory 40%		£11 0s. 0d. per ton c.i.f.
" Smalls 44%	(Ratio 3:1)	£14 0s. 0d. per ton c.i.f.
Baluchistan 48%	(Ratio 3:1)	£11 15s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade		nom.
Fluorspar—		
Acid Grade, Flotated Material		£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)		156s. 0d. ex works
Lithium Ore—		
Petalite min. 3½% Li_2O		40s. 0d./45s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O		40s. 0d./45s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O		£25 0s. per ton f.o.b. Beira
Magnesite, ground calcined		£28 0s./£30 0s. d/d
Magnesite Raw (ground)		£21 0s./£22 0s. d/d
Manganese Ore Indian—		
Europe (46% - 48%) basis 67s. 6d. freight		nom.
Manganese Ore (43% - 45%)		nom.
Manganese Ore (38% - 40%)		nom.
Molybdenite (85% basis)		8s. 5d. per lb. (f.o.b.
Titanium Ore—		
Rutile 95/97% TiO_2 (prompt delivery)		£35/£36 per ton c.i.f. Aust'n.
Ilmenite 52/54% TiO_2		£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)		60s. 0d./65s. 0d. per unit c.i.f.
Vanadium—		
Fused oxide 95% V_2O_5		8s. 11d. per lb. V_2O_5 c.i.f.
Zircon Sand Australian (65 - 66% ZrO_2)		£14 0s. per ton c.i.f.

Mining Finance

A New Market For Kaffirs?

When De Beers entered into partnership with the Tanganyika authorities, joint owners of Williamson Diamonds, the cost to De Beers, including the quasi-loan to the Tanganyika Government, totalled almost £4,140,000. Although it may be assumed that the De Beers-Anglo American organization would have been able to finance the deal internally (if necessary, by running down the reserve held against fluctuations in diamond prices), it is clear that this would be a very big step. Moreover, when application was made to the South African Reserve Bank for the non-Union currency necessary, permission was only granted in return for an undertaking that De Beers would make every effort to raise a similar amount abroad.

The solution, announced jointly by De Beers and Anglo American yesterday morning, lay in negotiations which had already begun between Anglo and one of the major West German banking organizations, Deutsche Bank Ag. of Frankfurt Am.-Main, with the two objectives of introducing Anglo's ordinary shares on German Stock Exchanges and of raising a loan for Anglo in Germany. The negotiations have now reached fruition and an agreement, to be signed in the near future, provides that the bank will take up (and then offer to the public) 50,000 convertible bearer bonds of DM.1,000 each (say £4,260,000 in all) with a 5½ per cent coupon. Each bond will be convertible into 10 ordinary shares at any time up to September, 1963, giving an equivalent price at present exchange rates of about 170s. 6d.

In turn, Anglo American will lend De Beers £4,200,000 at 5½ per cent, with conversion rights to match those attached to the German loan. All expenses of both loans will be met by De Beers.

The success of the issue in Germany seems assured. Until about a year ago interest rates in Germany were pitched somewhat higher than elsewhere. Since then, however, there has been a marked decline and only last week a public utility issue of bonds with a 6 per cent coupon was heavily over-subscribed.

On a wider view, the real importance of this latest pioneering move by Anglo is that it marks the re-emergence of Germany as a source of capital for enterprises outside the Federal Republic. This had been prevented previously, partly by a certain insularity on the part of the German investor, but more because the high interest rates obtainable at home gave him an incentive to look beyond his own borders. Nevertheless, the Central Bank has recently emphasized the need for interest rates in Germany to be brought into line with those in other countries. The new loan marks a considerable advance in the right direction.

With no doubts remaining as to the South African Government's desire for foreign capital, it would be surprising if the beach-head now established in Germany is left undeveloped. The next advance must remain a matter for conjecture.

LONDON MARKET HIGHLIGHTS

For most of the past week the Gold share market seemed to be battling against unfair odds. Once more the new Dillon Read gold share trust was exerting a favourable influence on sentiment generally. Even so, this proved to be no match for the adverse factor of political uncertainties which can unsettle the firmest of markets. News that Dr. Verwoerd had been picked to succeed the late Mr. Strijdom as South African Premier undoubtedly stimulated a great deal of thinking in Thogmorton Street.

Even so, there were still bright spots to be seen in the Kaffir market. Buffels, for instance, reached a new peak of 42s. 10½d. on their prominent position in the new American trust's portfolio. St. Helena, it must be admitted, eased for a while on their omission from the trust's list of shares. But General Mining and Anglo American moved ahead when it was realized that they had provided a substantial part of the shares acquired by A.S.A.I.T.

Apart from other considerations, Winkelhaak strengthened at one time to their best yet following talk that publication of production figures may begin a good deal earlier than had been expected. The August Rand returns which showed further profit records were received with satisfaction but little else. Even the sharp advance in Harmony's profit was ignored from a share price angle.

It is too early to tell at time of writing what the market effect will be of Anglo American's important new German financing. The view may well be taken, though, that politics or no politics, if American and German investors are prepared to enter the South African mining market, then London should see no reason to sell.

Tin shares provided the highlight of base metal sections. The announcement of restrictions on imports of Russian tin here was immediately followed by an advance in the metal price. Share quotations quickly followed suit. Unhappily, the rise in the metal was just as quickly lost, but share prices did not react as sharply as might have been expected. Outstanding on the rise were Geevor which topped 15s. 9d. on the fact that being unaffected by Tin Agreement restrictions, they would be particularly well placed to take advantage of the higher metal price. A much less happy state of affairs obtained in Beralt dealings. A fall of 2s. 6d. to 21s. 9d. followed the preliminary profits statement and its indication that the mine is probably working at a loss now.

Quiet trading conditions remained the order of the day in the Copper share market. Wall Street and the metal price dictated the course of share prices, but little violent movement was seen either way. Mountain Copper — not really a "copper" share these days — were an interesting feature, jumping into prominence with a rise of 10½d. to 10s. 6d. This followed a review of the company's prospects which underlined the strong asset position.

S. AFRICAN GOLD RETURNS FOR AUGUST

In spite of a lower gold price (249s. 6d. against the 250s. assumed in July) many of the younger South African gold producers set up new record profits in August.

Notable among the new highs was the report from Harmony, Central Mining's producer in the South of the Orange Free State field. Plant capacity at this mine is now 150,000 tons monthly, and some reflection of this was given in the milling in August of 92,000 tons, 7,000 tons more than in July. This enabled profits to advance to a new peak of £275,203 from gold and uranium, the improvement from £231,796 being achieved in the face of an increase of 1s. 7d. in cost per ton milled. Other good results in the O.F.S. were reported by Free State Geduld, President Brand and Western Holdings, all of the Anglo American group, and St. Helena, administered by Union Corporation.

The West Wits mines were also able to report good results, West Drie raising its grade still further to achieve a new record profit of £645,708 from gold and uranium, and Blyvoor continuing the upward trend in profits and grade begun in May. Doornfontein, however, milled 2,000 tons less than in July, causing a slight decline in earnings while Libanon also reported lower earnings, a rise in grade not being sufficient to compensate for higher costs.

Among the older producers there were few surprises. However, New Kleinfontein was able to turn last month's loss of £3,680 into a profit of £2,536 by an improvement in grade, while Geduld Proprietary on the Far East Rand almost doubled last month's earnings of £7,560 with a reduction in costs and an increase in yield per ton.

THE NEW KAFFIR TRUST

Publication of the initial portfolio of the new Dillon Read Trust, the American-South African investment company, shows that none of the South African shares acquired has been obtained through the market and that three finance houses, Anglo American Corporation of South Africa, General Mining and Finance Corporation and Anglo-Transvaal Consolidated Investment have largely monopolised the role of providing the portfolio of this Johannesburg registered company which,

as noted last week, is to offer 1,000,000 shares of £1 in New York this month at about $28 each or a premium of about £9 per share.

The initial portfolio is expected to cost approximately £7,900,000, but its exact cost cannot become apparent until September 26, because the sales to the new trust are based on average market prices between June 16 and that date and it has to be remembered that the market has so far been rising during that period. Current market value of the portfolio is put at some £8,200,000 and the finance houses that have provided the shares account for approximately the following proportions of this market value :— Anglo American £4,500,000, General Mining £2,000,000, Anglo-Transvaal £1,000,000, New Union £400,000 and Union Corporation £260,000. The actual amounts received by the houses will be rather less owing to cost being below present market prices, but the calculation is near enough to show the degree of extra liquidity that will accrue to these concerns as a result of the deals. Owing to the houses' conservative methods of writing down their shareholdings some quite useful extra profits from the deals should come into their 1958 accounts. It is notable that none of the U.K.-taxed mining houses has entered into the transaction with the minor exception of Union Corporation which only provided 300,000 Winkelhaak. Central Mining, Consolidated Gold Fields and Johannesburg Consolidated do not figure at all. Presumably the resultant once and for all profits would be embarrassing fiscally.

The full portfolio and the finance houses that supplied the individual shares are given in the accompanying table. As may be seen, the Gold Fields group shares, Saaiplaas, Doornfontein, West Driefontein and Venterspost, came from Anglo American and General Mining. A.S.A.I. also has some extra shares under option until October 10. These comprise : 125,000 Harmony, 600,000 Free State Saaiplaas, 50,000 Buffels, 50,000 Stilfontein, 800,000 Anglo-Transvaal Industries, 100,000 Anglo-Transvaal Collieries and 80,000 West Wits. All these options have been granted by Anglo-Transvaal with the exception of that on Harmony which comes from New Union.

It is notable that the initial A.S.A.I. portfolio includes shares in all but one of the successful new gold mines of the Transvaal and Orange Free State and all three of the developing concerns, Riebeeck, Saaiplaas and Winkelhaak. The absentee is St. Helena. By and large, the market has been taking this as a bull-point for these shares on the principle that apparently neither the parent house, Union Corporation, nor the Anglo American group, which has a substantial holding, wished to part with any St. Helena. The only representatives in the portfolio of the older mines are Blyvoor, Durban Deep, Venterspost and South Roodepoort.

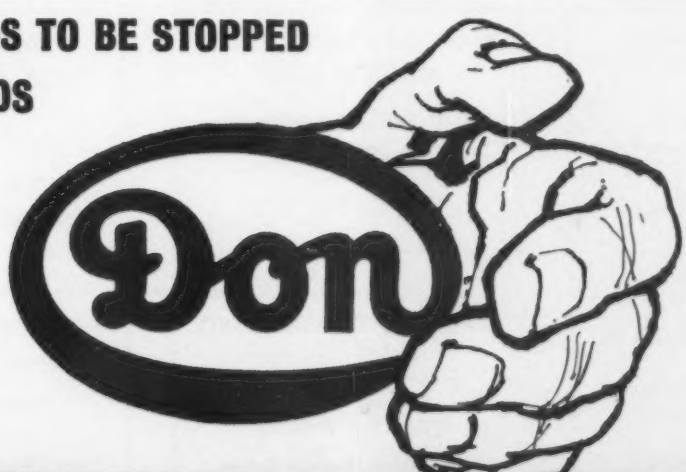
If the A.S.A.I. issue in New York is a big success then it may well turn the attention of other U.S. trusts and houses to the merits of South African gold shares, merits which have been studiously ignored for many years. But now there is a rather more favourable climate. For the first time for a quarter of a century some American investors are beginning to look upon the dollar with a certain amount of distrust. The rush for equities that has forced up prices on Wall Street this year to an extraordinary degree against a background of recession has been one result of this. It is possible that a new look at gold shares may be another consequence.

Shares	Company	Finance House
125,000	Free State Geduld	A.A.
110,000	Western Holdings	A.A.
200,000	President Brand	A.A.
725,000	Welkom	A.A.
350,000	President Steyn	A.A.
100,000	Harmony	A.A.
150,000	Harmony	N.U.
300,000	Riebeeck	G.M.
200,000	F.S. Saaiplaas	G.M.
150,000	Buffels	A.-T.
200,000	Buffels	G.M.
200,000	Hartebeest	A.-T.
250,000	Vaal Reefs	A.A.
150,000	Stilfontein	G.M.
450,000	Blyvoor	A.A.
75,000	Blyvoor	G.M.
25,000	Blyvoor	N.U.
400,000	Doornfontein	A.A.
50,000	Doornfontein	G.M.
232,500	Durban Deep	G.M.
25,000	W. Driefontein	G.M.
100,000	Venterspost	G.M.
50,000	S. Roodepoort	G.M.
300,000	Winkelhaaak	U.C.
100,000	Winkelhaaak	N.U.
50,000	S.A. Pulp & Paper	G.M.
100,000	Scaw Metals	G.M.

A.A.=Anglo American Corporation. G.M.=General Mining. A.T.=Anglo-Transvaal Cons. N.U.=New Union Goldfields. U.C.=Union Corporation.

IF IT NEEDS TO BE STOPPED

—IT NEEDS



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Economic Developments in Africa, 1956-57, published by the United Nations Department of Economic and Social Affairs, is issued as a supplement to the World Economic Survey, 1957. The repercussions on the economies of tropical African countries of changes in commodity markets are examined, and a brief review is given of significant economic developments in 1957 in the principal regions, northern, tropical, and southern Africa.

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A booklet reproducing the full text of the lectures given by Professor Howard T. Lewis, of the Graduate School of Business Administration, Harvard University, at the Advanced Purchasing Course at Oxford in April, 1958, has been issued. The publication is entitled, "The Proceedings of the First Advanced Purchasing Course held at Christ Church, Oxford, April, 1958", and is published by the Purchasing Officers' Association who conducted the course. Included are three very detailed case-problems followed by Professor Lewis's analysis of their solution.

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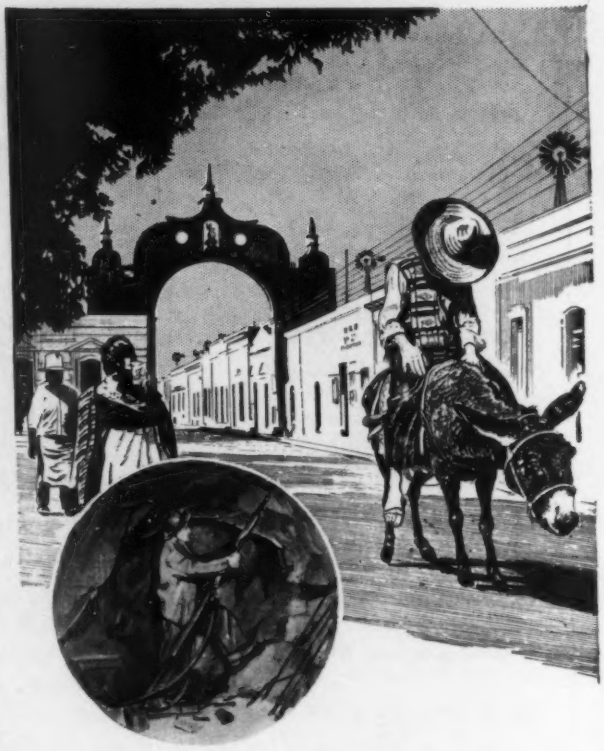

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